BUREAU OF LAND MANAGEMENT
VALE DISTRICT OFFICE
100 OREGON STREET
VALE, OREGON
97918

Mormon Basin / Pedro Mountain Fuels Management Project

ENVIRONMENTAL ASSESSMENT

DOI-BLM-OR-V000-2009-004-EA

January 2015

BLM
Vale District

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1 INTRODUCTION

1.1 SUMMARY

The Vale District Bureau of Land Management (BLM) proposes to implement a multi-year, phased fuels management and ecological restoration project within the Mormon Basin / Pedro Mountain Planning Area in the Baker Resource Area. Silvicultural thinning, conifer (conifer, Ponderosa Pine, Douglas-fir) cutting, herbicide application, and prescribed fire activities would be primary management tools.

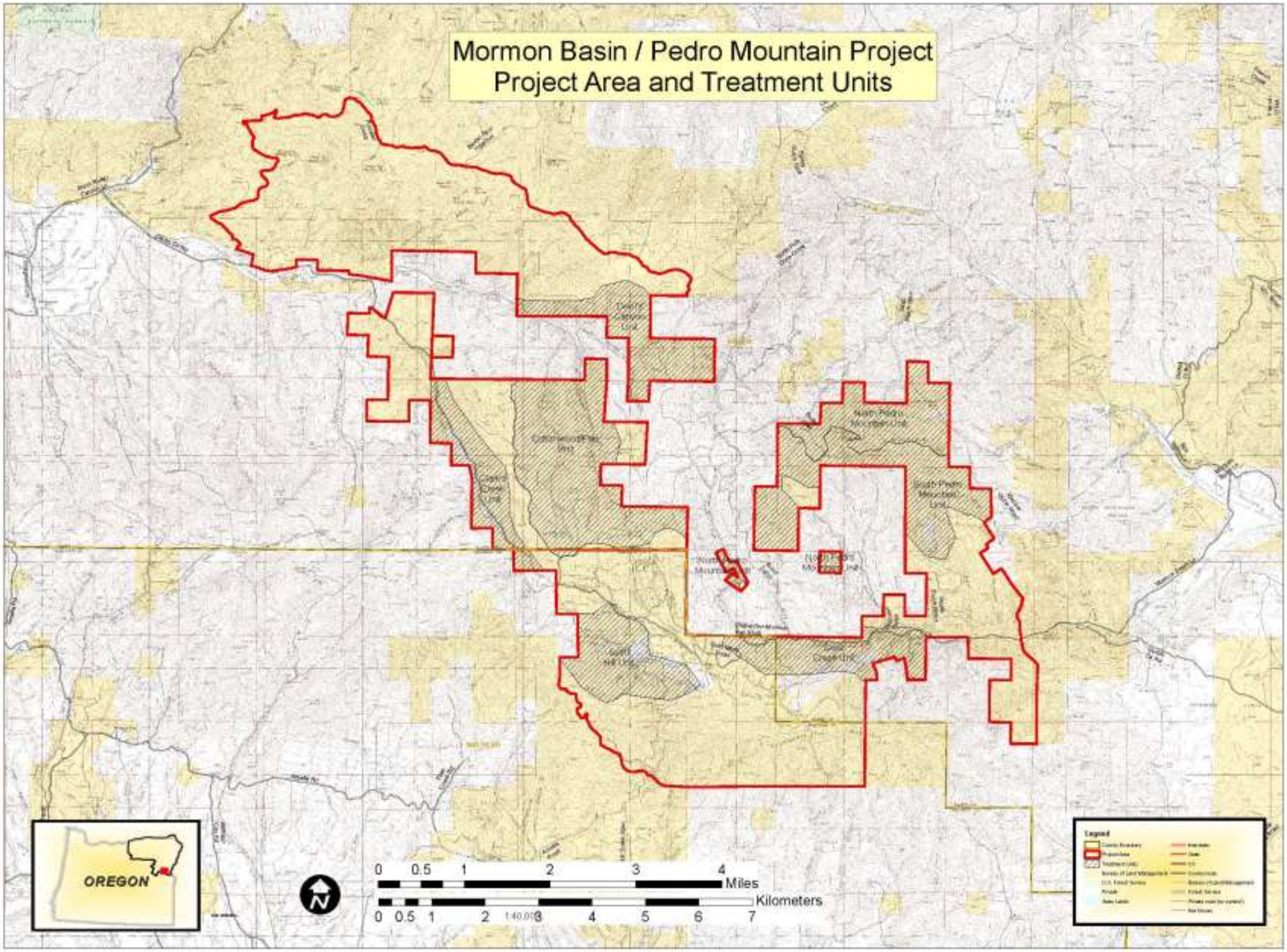
Fire-dependent ecological communities in the project area lack resiliency to wildfire, insects, disease, and other disturbances. Coniferous forests, shrublands, and riparian areas that function as those under historical conditions are more stable, support greater wildlife species diversity; and enhance watershed function. Ecosystems that are deficient of these conditions are likely to be especially vulnerable to the increased fire frequencies and intensities that will come with a changing climate.

High fuel loading within coniferous forests and woodlands has increased the risks of ground fires becoming crown fires, and small fires becoming stand-replacement wildfires. Reducing hazardous fuels within forested stands will help protect life, property, and resource values, as well as increase the safety of personnel involved in wildland fire management actions.

The quality and productivity of browse and forage species available to wildlife in the project area needs to be improved. Bunchgrasses and forbs are important forage for elk, mule deer, bighorn sheep, and avian species, and have been reduced or are completely absent in plant communities undergoing conversion to juniper woodlands and in closed canopy mixed conifer forest stands. Key wildlife browse species such as aspen, bitterbrush and mountain mahogany are declining under the influence of conifer encroachment.

This environmental assessment (EA) examines the potential effects of: continuing existing management (the No Action Alternative); implementation of a Proposed Action (Alternative 2); as well as an additional action alternative (Alternative 3) within the project area. An interdisciplinary team of specialists from the Vale District conducted the environmental analysis. The EA will supply the decision-maker, the Baker Resource Area Field Office Manager, with information to utilize in the decision-making process in compliance with the National Environmental Policy Act (NEPA). The EA will allow BLM to determine if there are significant impacts not already analyzed in the Environmental Impact Statement (EIS) for the Vale District's Baker Resource Management Plan (BRMP FEIS, USDI-BLM, 1989). If the decision-maker determines that there are significant impacts associated with the project, then analysis of effects will be transitioned to an EIS analysis and planning document. If the EA shows that there are no significant impacts associated with the project, then preparation of a Finding of No Significant Impact is appropriate. A decision record may be signed by the Baker Field Office Manager following public comment on the EA to document the decision.

Figure 1.1 - Mormon Basin / Pedro Mountain Fuels Management Project Vicinity Map



1.2 PROJECT AREA DESCRIPTION AND LOCATION

The Mormon Basin / Pedro Mountain project area encompasses approximately 15,289 acres of BLM lands and 469 acres of privately owned lands within portions of ten BLM grazing allotments and is bisected by the boundary of Baker and Malheur counties (Fig. 1.1, 2.1-2.6).

It is composed of two discrete units (Mormon Basin and Rooster Comb) that are situated approximately 25 air miles southeast of Baker City, Oregon. Grazing allotments included within the project area include: South Bridgeport (T. 12 S., R. 41 E., Sections 21-28, 35-36; T. 12 S., R. 42 E., Sections 19, 29-32; T. 13 S., R. 41 E., Sections 1-2, 12; T. 13 S., R. 42 E., Sections 5-8), Devils Canyon (T. 12 S., R. 41 E., Sections 26-27, 35-36; T. 12 S., R. 42 E., Sections 30-32; T. 13 S., R. 42 E., Section 5), Towne Gulch (T. 12 S., R. 41 E., Section 35; T. 13 S., R. 41 E., Section 2), Log Creek (T. 13 S., R. 41 E., Sections 1, 12), Pedro Mountain (T. 12 S., R. 42 E., Sections 33, 35; T. 13 S., R. 42 E., Sections 2-3, 8-16), Dixie Creek (T. 13 S., R. 42 E., Sections 2; 11-14), Mormon Basin (T. 13 S., R. 42 E., Sections 13-14; 17-30), Bowman Flat (T. 19 S., R. 35 E., Sections 14-15; 22-23; 26), and Pine Creek (T. 19 S., R. 35 E., Sections 13; 24-25). Major road access to the project is provided by the Clarks Creek Road (Baker County Road 1120), which approaches the project area near its northwestern boundary. The Mormon Basin Lane provides access to the project area through Rye Valley from the east. The Mormon Basin Cutoff Road (Malheur County Road 610) descends into Mormon Basin from Basin Creek and provides access to the project area from the south. The Pedro Mountain area is only accessible through a privately owned road system in Tater Patch Gulch, Burnt Cabin Gulch, and Thornton Gulch. The Rooster Comb BLM road, which forms the northern boundary of the project area, connects the Clarks Creek Road and the Devils Canyon Road on the east.

1.3 PURPOSE AND NEED FOR ACTION

The purpose of the Proposed Action is to achieve management objectives described in the Baker Resource Area Resource Management Plan (RMP) Record of Decision within the Mormon Basin / Pedro Mountain planning area by:

1) Reducing hazardous fuels
2) Restoring plant communities
3) Improving wildlife habitat diversity

The need for action is based on degraded landscape conditions and threats to resources, private property and fire fighter safety. This was determined by comparing existing conditions of hazardous fuels, wildfire risks, rangeland plant communities, forest health, and wildlife habitat to the desired condition for those resources.

Chapter 2 provides the analytical basis for comparison of the action alternatives to the No Action Alternative. Chapter 3 (Affected Environment) summarizes the existing physical, biological, social, and economic environments of the project area.

Figure 1.2 - Landscape view of Clarksville with Rooster Comb unit in background ca. 1910. Note open condition of hillside behind town site (Photograph courtesy of Baker City Library).

Figure 1.3 - Landscape view of Clarksville with Rooster Comb unit in background in 2010. Note a dramatic increase in conifers across the hillside since 1910 photograph was acquired.

1.4 CONFORMANCE WITH APPLICABLE LAND USE PLANS

The Mormon Basin / Pedro Mountain Fuels Management Proposed Action and its alternative are consistent with Baker RMP and Record of Decision, which was approved July, 12 1989. The project area is located within the Pedro Mountain Geographic Unit of the Baker RMP. Major resources identified for the unit include minerals, forest, and wildlife; minor resources include range, watershed, recreation, and cultural.

The mechanical and hand silvicultural treatment of trees is in accordance with the Baker Resource Management Plan (1989) which directs an approximate 24,000 board feet (Mbf) of timber over 10 years from the commercial forest land base in the Baker Resource Area (BRA). Currently, the BRA has harvested 2775 Mbf over the last 10 years, none within the proposed Project Area. All timbered lands within the project area are within the commercial base and none are excluded from harvest. All standard design features will be followed as outlined in the 1989 Baker RMP to protect wildlife, fisheries, soil, hydrology, special status plants and important landscape ecological functions.

It is also in conformance with the Southeastern Oregon RMP (SEORMP, 2002), which covers a planning area that includes the Malheur and Jordan resource areas on the Vale District. The SEORMP, therefore applies to the portion of the project area that is south of the Baker Resource Area within the Malheur Resource Area. It is also in conformance with:

- Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Record of Decision (2007).
- Vegetation Treatments Using Herbicides on BLM Lands in Oregon Record of Decision (2010).

In addition to the RMP, the activities described in this EA are consistent with management direction provided by:

The Vale District Fire Management Plan (2004). The planning area lies within the Burnt River, Pedro Mountain, and Baker Scattered Tracts Fire Management Units (FMU). The objectives and Desired Future Conditions for the Burnt River and Baker Scattered Tracts FMU's call for the use of prescribed fire and mechanized vegetation manipulations to reduce hazardous fuels and increase forage available to wildlife and livestock. The overall fire management strategy in the Pedro Mountain FMU is to utilize mechanical treatments and suppression to restrict burned areas to less than 250 acres.

The proposed project addresses four of the five key points set forth within the National Fire Plan (NFP). Additionally, the Proposed Action responds to the goals of A Collaborative Approach for Reducing Wildfire Risk to Communities and the Environment: 10-year Comprehensive Strategy.

The key points of the NFP are:

1) Firefighting preparedness
2) Rehabilitation and restoration of areas affected by wildfire
3) Hazardous fuels reduction
4) Promote community assistance
5) Accountability

The goals of the 10-Year Comprehensive Strategy are:

1) Improve Fire Prevention
2) Reduce Hazardous Fuels
3) Restore fire-adapted ecosystems
4) Promote community assistance

Finally, the Proposed Action is in compliance with state, tribal, and local laws, regulations, and land use plans.

1.5 DECISION TO BE MADE

The scope of the analysis and the project decisions are limited to the Mormon Basin / Pedro Mountain Project Area. This EA will provide the decision-maker with the information needed to make the following decisions:

- Which alternative would best move the Mormon Basin / Pedro Mountain Project Area toward the resource objectives provided in the Baker RMP while responding to the identified needs and issues?

- Would additional design criteria and monitoring requirements need to be applied to the proposed activities?

- Would the selected alternative have a significant effect on the human environment, therefore requiring preparation of an Environmental Impact Statement?

If an action alternative is selected, project implementation could begin in 2015 and could include multiple treatments and other activities over approximately the next ten years.

1.6 IDENTIFICATION OF ISSUES FOR ANALYSIS

Issues are points of concern about environmental effects that may occur as a result of implementing the Proposed Action. They are generated by the public, other agencies, organizations, and BLM resource specialists in response to the Proposed Action.

Issues describe a dispute or present an unresolved conflict associated with potential environmental effects of the Proposed Action. Issues are used to formulate alternatives, prescribe project design elements, and focus the analysis on specific environmental effects. Significant issues are determined based on the potential geographic extent, duration of their effects, or intensity of interest or resource conflict, if not addressed through project design or otherwise mitigated. Issues for this project were identified by the Interdisciplinary Team (IDT) after scoping and preliminary analysis of the project area and reviewing public comments. The significant issues were approved by the Responsible Officials (Davis and Wood, 2011-2014).

The IDT identified several significant issues as consistent with the Purpose and Need of this project and which were raised during both internal and public scoping. These issues include:

1. **Roads**: The Hells Canyon Preservation Council (HCPC) raised the issue of roads as it relates to the Proposed Action. The HCPC requested that no new or temporary road construction be completed during the project because roads can contribute to soil damage, degradation of water quality, spread of weeds, loss of carbon storage, and loss of wildlife habitat. The HCPC also requested that BLM examine opportunities for road decommissioning within the current project area.

2. **Expansion of Invasive Annual Grasses**: The IDT identified the issue of potentially expanding the range of invasive annual grass species through implementation of the Proposed Action. The concern was greatest for high energy southern aspects in the project area where cheatgrass (*Bromus tectorum*) and medusahead (*Taeniatherum caput-medusae*) are established in lower elevation sagebrush plant communities.

3. **Broadcast Application of Herbicides**: Unique potential risks of using broadcast herbicide applications to control invasive annual grasses was identified as an issue by BLM staff and members of the public. Potential risks of using an herbicide would include exposure of non-target native vegetation, inadvertent exposure of local wildlife during application, and possible risks to human health. Risk associated with herbicide application is discussed in detail within the Vegetation Treatments Using Herbicides on BLM Lands in Oregon Final Environmental Impact Statement, pp. 85-93. (2010).

1.7 Issues Considered But Not Analyzed Further

A Wilderness Review Intensive Inventory in Oregon and Washington was completed in March of 1980 evaluating the presence of wilderness characteristics on BLM-administered lands. The BLM lands in Mormon Basin and Pedro Mountain Fuels Management Project area were not identified as meeting the minimum criteria for consideration of containing wilderness character. In 2009 and 2010, wilderness characteristics inventory maintenance was completed for the Baker Field Office to review current conditions of BLM lands and to document changes that had occurred since the original inventory. This included lands within the proposed project area. No areas within the Mormon Basin / Pedro Mountain Fuels Management project area were determined to contain wilderness character. This issue will not be analyzed further within the EA.

Removal of livestock grazing from allotments involved in the project was also considered, but was eliminated from further analysis. Prior to the Taylor Grazing Act of 1936 and improved livestock management, unregulated grazing likely removed the fine fuels necessary to carry fire across range and forest lands and reduce conifer expansion. In the absence of fire, conifers have been able to rapidly spread into previously open areas and now dominate the habitat across much of the project area. Modernized grazing management does not appear to be a mechanism promoting juniper expansion on arid western rangelands (Soule' and Knapp, 1999). Burkhardt and Tisdale (1976) found little relationship between range condition of big sagebrush-grass stands and the rate of juniper invasion. Expansion of conifers appears to be directly related to the cessation of periodic fires (Burkhardt and Tisdale, 1976), and is not directly influenced by livestock grazing. Although conifer expansion has occurred, current grazing practices have not been identified as a causal factor and the cessation of such activities would not reduce encroached conifers or fuel hazards. Therefore, changes in grazing management would not meet the purpose and need of the project. The need for livestock grazing adjustments will continue to be considered during periodic evaluation of grazing permits and Standards of Rangeland Health and Guidelines for Livestock Grazing Management.

2 ALTERNATIVES INCLUDING THE PROPOSED ACTION

There are three alternatives. Alternative 1 is the No Action alternative and represents the continuation of current management. Alternative 2 is the Proposed Action, which would treat portions of the 15,289 acres within the project area with a combination of mechanical methods and prescribed fire. Alternative 3 is a modified version of the Proposed Action that would not allow: construction of temporary roads within the project area for the purpose of implementation: or any broadcast application of herbicides.

2.1 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

An alternative that would use only prescribed fire to accomplish fuels management needs in the project area was considered but not developed for further analysis. Forested stands in the project area are characterized by highly dense conditions that present a significant risk for the escapement of prescribed fire. It was determined that mechanical thinning and fuels reduction activities would be required prior to treatment of the stands with prescribed fire. Furthermore, use of only prescribed fire to treat conifer encroachment within sagebrush-steppe and riparian ecological communities would not allow for sufficient retention of shrubs that are important sources of wildlife browse and cover, which would not meet the desired condition of the proposed project area.

An alternative that would use only noncommercial thinning to reduce understory ladder fuels and pile and burn the resulting slash was considered but not developed for further analysis. This alternative was eliminated because it did not address the following project objectives: a) reduction of overall canopy closure in ponderosa pine stands; b) raise existing canopy base height to sufficient levels; and c) generate economic outputs to the local communities.

2.2 ALTERNATIVE 1: NO ACTION ALTERNATIVE

Under this alternative, there would be no application of prescribed fire, cutting of conifers in stands of mahogany or aspen, thinning of forestlands, or broadcast application of herbicide on low elevation stands of sagebrush with understories dominated by annual grasses. Conversion of rangelands to juniper woodlands within the planning area is occurring under the current management. The risk of a high intensity crown fire occurrence in the project area is also increasing as density and distribution of fuels are becoming increasingly hazardous. Management under the No Action Alternative would proceed under the current Baker RMP and all other relevant policy direction.

2.3 ALTERNATIVE 2: THE PROPOSED ACTION

2.3.1 SUMMARY

The Proposed Action emphasis for treatments in forested areas is to reduce densities of small diameter conifers and selectively removing larger conifers so as to reduce crown fire hazards while moving the stand towards a historic species composition and early-to-mid seral stage. The emphasis in sagebrush-steppe, woodlands, and riparian areas is to move conditions toward historic species composition and structure while reducing fuels in the vicinity of active mining operations, structures, and private lands.

The Proposed Action is to utilize two silvicultural thinning prescriptions conifer cutting, prescribed burning and applications of herbicide to annual grasses to reduce fuels and restore fire adapted ecosystems on up to 5,000 acres of mixed conifer forests and 10,500 acres of sagebrush-steppe within the Mormon Basin / Pedro Mountain project area. These treatments would be accomplished through a combination service contracts, stewardship contracting, small timber sales, and federally employed personnel.

The Proposed Action consists of five separate treatments (described below) and eight activities (Appendix B). Under each of the treatments are management objectives and prescribed fire and/or mechanized activities that would be utilized to meet the objective. Following each treatment heading, a list of activities that would be utilized to attain the objectives is displayed in order of importance. The Activities Section (Appendix B) describes each of the prescribed fire and mechanical activities that would be utilized to meet the treatment objectives in detail. Project design criteria, for protection or maintenance of specific resource values, have been incorporated into the Proposed Action. Project design elements are the result of specialist recommendations and approval by the deciding official. A detailed list of project design elements is presented in Chapter 2 (Alternatives Including the Proposed Action).

Treatments would take place on federal lands within portions of the South Bridgeport, Devils Canyon, Towne Gulch, Log Creek, Mormon Basin, Dixie Creek, Bowman Flat, and Pine Creek grazing allotments that comprise the project area between 2015 and 2025.

2.3.2 TREATMENT DESCRIPTIONS

2.3.2.1 Silvicultural Thinning in Warm-Dry Forest for Fuels Reduction Treatment: Non-Commercial Thinning, Pile Burning, Underburn

Under this treatment, a variable density thinning from below silvicultural prescription followed by prescribed fire would be applied to stands of warm-dry (Ponderosa pine, Douglas fir mixed conifer) forested biophysical environments in the project area. This treatment would be the primary silvicultural prescription utilized under the Proposed Action and would account for approximately 80% of treated acres within eight designated silvicultural treatment areas (See Figures 2.1 and 2.2) in the project area. Accomplishing this portion of the Proposed Action would result in no more than approximately 3000 treated acres within the project area. Approximately 999 MBF over approximately 400 acres (2,475 bf/ac) will be offered in sawtimber through timber sales to utilize incidental timber created during restoration treatments. The rest of the project area will be conducted as stewardship where any commercial timber removed will be traded for restoration services.

Within the five warm-dry forest treatment areas (Fig. 1.1), ladder fuels would be reduced sufficient to interrupt the initiation of a crown fire by felling understory trees (<9 inch diameter at breast height [dbh]) so that remaining trees are spaced at an average of 16 feet. Additional objectives of this treatment include reducing the potential for crown fires by reducing canopy closure to a mean total of 40%; and raising canopy base height to a mean of 20 feet above ground surface. All grand fir, expansion juniper, and Douglas fir with the upper two-thirds of a live crown infested with mistletoe, and severely stressed/diseased conifers would be priorities for removal under this treatment. The largest and most vigorous of ponderosa pine and Douglas fir would be selected for retention. Retention densities would vary from 11 to 109 square feet of basal area per acre throughout treated stands and average between 20 to 80 feet of basal area.

The non-commercial thinning aspect of the warm-dry thinning treatment would target stands composed primarily of small diameter (<9 inch dbh) conifers to reduce stocking and fuel laddering potential. Commercial harvest of large diameter (> 9 inch dbh) trees would be implemented to decrease canopy continuity within ponderosa pine stands while selecting large, vigorous pine and Douglas fir for retention. In cooler and moister portions of the treatment areas, some larger (18-24" dbh) true fir would be retained as overstory and small patches of understory trees may be retained in densities that may reach up 160 square feet of basal area. The thinning activity would break up fuel continuity by removing understory and overstory trees from some patches while retaining small stands of trees in other patches (variable density thinning). Fuels generated by thinning activities would be treated by piling and burning, mechanical crushing or whole tree yarding. An underburn would be conducted within ten years of the thinning treatment to further reduce ground fuels (litter, twigs, branches <3") in the same stands.

If economically feasible, non-sawlog material generated by silvicultural thinning activities would be removed for biomass utilization. Otherwise, the treatment would include a follow-up application of piling and burning, and then underburning to reduce surface fuels. The objective for the prescribed fire phase of the treatment would be to reduce surface fuels by a mean total of more than 50% in treated units.

2.3.2.2 Silvicultural Thinning in Hot-Dry Forest for Fuels Reduction Treatment: Non-Commercial Thinning, Pile Burning, Underburn

Under this treatment, a variable density thinning from below silvicultural prescription followed by prescribed fire would be applied to stands of hot-dry (Ponderosa pine dominant) forested biophysical environments in the project area. This treatment would be the second silvicultural prescription utilized under the Proposed Action and would account for the remaining approximately 20% of treated acres; mostly in a treatment area located on the southern flank of Pedro Mountain (See Figures 2.1 and 2.2). This phase of the Proposed Action would result in no more than approximately 2000 treated acres within the project area.

Within the hot-dry silvicultural treatment area, ladder fuels would be removed to reduce the likelihood of fire moving from the surface to the crowns by thinning understory trees so that remaining trees are spaced at average of 20 feet across all tree size classes. To move the proposed project area towards the desired condition, additional objectives of the treatment include: reducing overstory fuels so that a mean total of 30% canopy closure characterizes the stand; and, raising the canopy base to a mean of 22 feet above ground surface. All grand fir, expansion juniper, and most Douglas fir would be priorities for removal under this treatment. Ponderosa pine would be favored for retention with the largest and most vigorous trees selected to retain. Retention densities would vary from 6 to 40 square feet of basal area per acre throughout treated stands.

Non-sawlog material generated by silvicultural thinning of hot-dry forest types would be considered for biomass utilization. Fuels not utilized as biomass or as a commercial product would be piled and burned on site. An underburning activity to reduce surface fuels would be conducted within ten years of completing thinning treatments. The objective for the prescribed fire phase of the treatment would be to reduce surface fuels by a mean total of more than 50% in treated units.

The non-commercial thinning aspect of the silvicultural thinning treatment would target stands composed primarily of small diameter (<9 inch diameter) conifers to reduce stocking and fuel laddering within hot-dry coniferous forest. Fuels generated by these thinning activities would be treated by piling and burning, mechanical crushing or whole tree yarding. Most slash generated between December 1 and July 1 would be removed from treatment units to guard against tree mortality from Ips bark beetle attacks. An underburn would be conducted within ten years of the thinning treatment to further reduce ground fuels (litter, twigs, branches <3") in the same stands.

2.3.2.3 Mountain Big Sagebrush / Bunchgrass Restoration Treatment: Pile Burning, Broadcast Burning, Jackpot Burning, Herbicide Application for Non-native Annual Grass Control

There are approximately 6,300 acres of mountain big sagebrush plant communities within the project area that are in the early or intermediate stages of transition to juniper woodlands. Under the Proposed Action, all conifers encroaching upon mountain big sagebrush/bunchgrass ecological communities in the project area would be treated with a combination of manual cutting and prescribed fire. A broadcast application of herbicide may also be used where understories are dominated by exotic annual grass.

Within mountain big sagebrush ecological communities, it is a project objective to treat between 80 and 90 percent of communities that display any level of conifer encroachment. It is also an objective to reduce live conifer density within mountain big sagebrush/bunchgrass communities by a mean total of 70%.

Pile burning and jackpot burning would be primary activities used under the mountain big sagebrush/bunchgrass restoration treatment. Broadcast burning would only be considered for the mountain big sagebrush/bunch grass communities in phases II-III (See Section 3.5.1.3 for definition) of conversion to juniper woodland within the Rooster Comb portion of the project area (See Figure 1.1). Implementing an aggressive prescribed fire program to restore historically present range ecosystems is a priority outlined in the Baker RMP (1989).

Following a broadcast burn, all living western juniper remaining within a treatment area may be cut and burned in piles or jackpot burned. The remaining acreage within the mountain big sagebrush/bunchgrass treatment area would be treated by manually cutting conifers for piling and burning.

2.3.2.4 Low Elevation Sagebrush / Bunchgrass Restoration Treatment: Jackpot Burning, Pile Burning, Herbicide Application for Annual Grass Control

Under the Proposed Action, western juniper encroaching upon Wyoming and basin big sagebrush\bunchgrass ecological communities in the project area would be treated with a combination of manual cutting, prescribed fire, and herbicide applications. A broadcast application of a selective herbicide targeting non-native annual grasses would be considered under this treatment for areas where cheatgrass and medusahead wildrye are present in the understory. There are approximately 2000 acres of Wyoming and/or basin big sagebrush\bunchgrass plant communities within the lower elevations (less than 4500 feet above mean sea level [amsl]) of the project area that are in the early to intermediate stages of transition to juniper woodlands.

Within lower elevation sagebrush ecological communities, it is a project objective to treat between 80 and 90 percent of communities that display any level of conifer encroachment. Additional objectives include reduction of live conifer density within Wyoming sagebrush/bunchgrass communities by a mean total of 70% and invasive annual grass cover by 70%.

Conifer cutting followed by jackpot burning or pile burning and combined with application of a selective herbicide for annual grass control would be primary activities utilized in the Low Elevation Sagebrush/Bunchgrass restoration treatment. Small amounts (less than 100 acres) of the conifer cut and leave activity may be utilized in the low elevation sagebrush treatment areas if it can be applied without creating hazardous fuels. In no circumstance would stands of lower elevation Wyoming and/or basin big sagebrush be intentionally broadcast burned.

2.3.2.5 Mountain Shrub Maintenance / Riparian Hardwood Enhancement Treatment: Jackpot Burning, Pile Burning, Conifer Cutting

Under the Proposed Action, conifers encroaching upon identified stands of mountain mahogany, bitterbrush, riparian hardwoods such as aspen, would be cut, removed or burned to preserve and enhance these important wildlife habitats.

Under the Proposed Action, within identified stands of mountain mahogany, bitterbrush or riparian hardwoods, it is a project objective to treat 90 – 100 % of these areas affected by conifer encroachment where patches of at least 1/8 of an acre exist. An additional objective would be to treat any upland groves of quaking aspen or deciduous woody riparian vegetation that are affected by conifer encroachment. Accomplishing this objective would result in no more than approximately 1500 treated acres within the planning area. Resource advisors would recommend application of this treatment option to the deciding official if sufficient bitterbrush, mahogany, or deciduous woody vegetation is identified on site.

Jackpot burning and pile burning would be the principal tools used under this treatment to reduce encroachment of conifers into stands of mountain mahogany, or deciduous woody vegetation while maintaining existing plants. Manual cutting of conifers with no follow-up burning may also be occasionally used in such stands. In aspen stands up to 1/3 of older, dying aspen maybe cut and left on site to rejuvenate sprouting. Late season broadcast burning would be applied for the purpose of aspen restoration wherever possible. This treatment may also include construction of woven wire exclosures around stands of aspen following the application of prescribed fire. Exclosures would remain in place until suckers or saplings attain a height that is above the reach of most grazing animals as determined by rangeland monitoring.

2.3.3 BROADCAST APPLICATION OF HERBICIDE FOR ANNUAL GRASS CONTROL

A broadcast application of the herbicide imazapic would be a primary activity applied under the Low Elevation Sagebrush / Bunchgrass Restoration treatment in the Proposed Action. It may also be used as an activity under the Mountain Big Sagebrush / Bunchgrass treatment if deemed necessary by project resource advisors. Application would always occur after prescribed burning of juniper piles or jackpots has occurred to decrease the amount of herbicide intercepted by downed trees.

Herbicide would be applied according to label requirements in the fall season (October – November) prior to grass emergence using an ATV mounted sprayer. A follow up herbicide application in a subsequent year may be necessary to attain objectives of the sagebrush / bunchgrass restoration treatments. Application of herbicide would be followed by seeding with a mixture of native and desirable non-native perennial grass and forb species. All pertinent Standard Operating Procedures (SOPs) and Mitigating Measures from the Vegetation Treatments Using Herbicides on BLM Lands in Oregon ROD (Oct 2010) would be observed during implementation (Appendix 2. P 457-467).

Figure 2.1 - Pedro Mountain Units

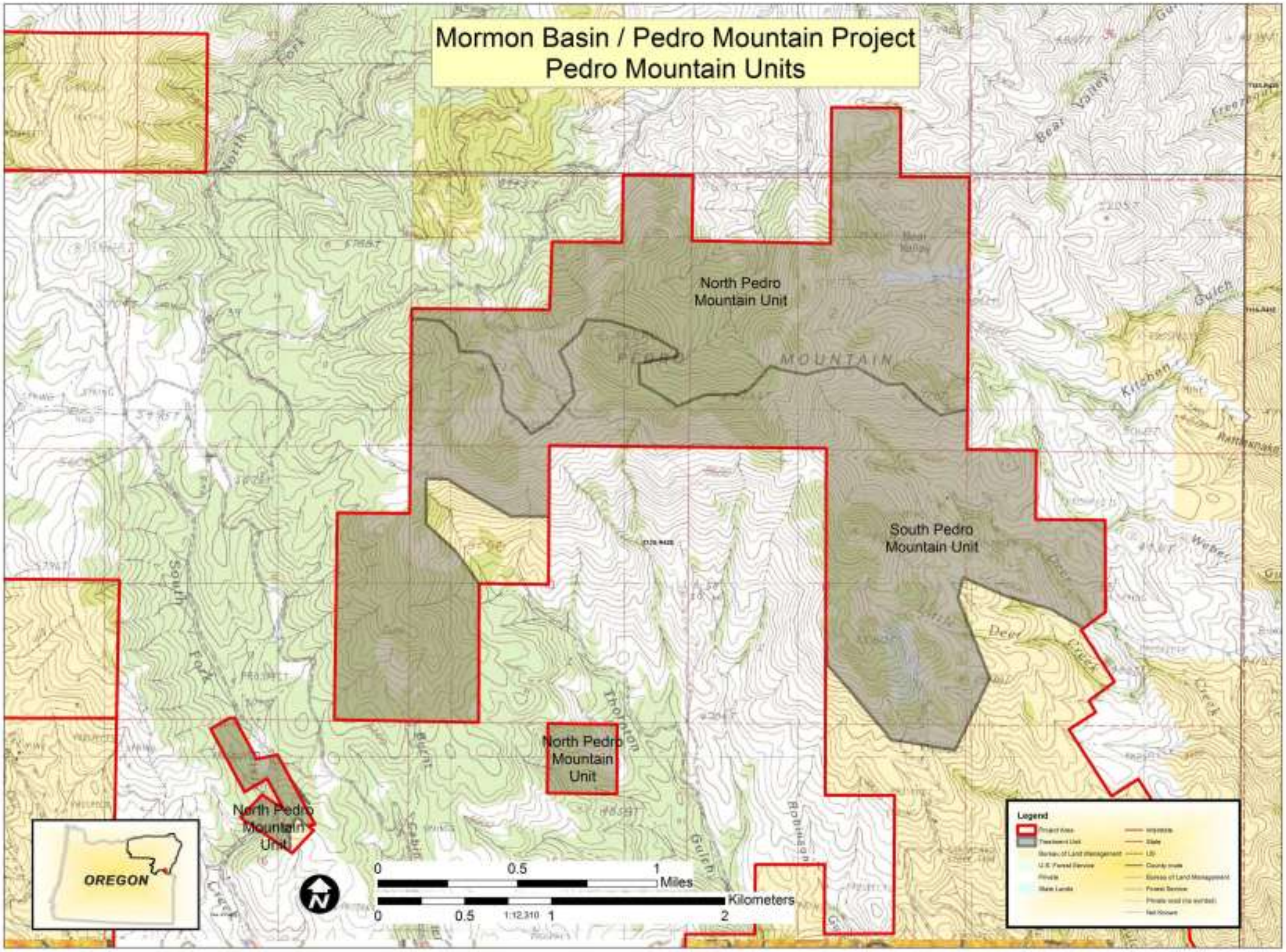


Figure 2.2 - Dixie Creek Unit

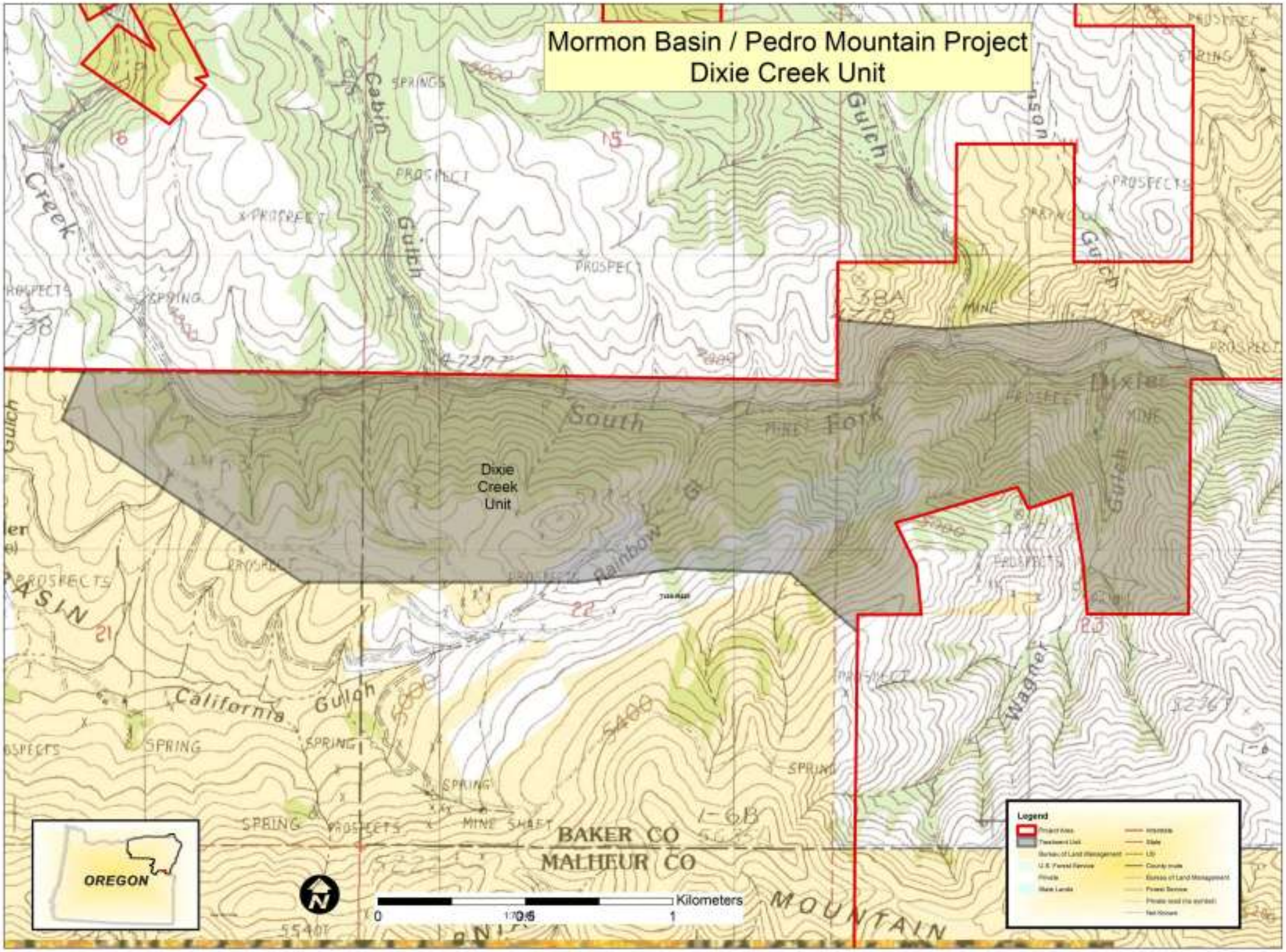


Figure 2.3 - Clark's Creek / Cottonwood Creek Units

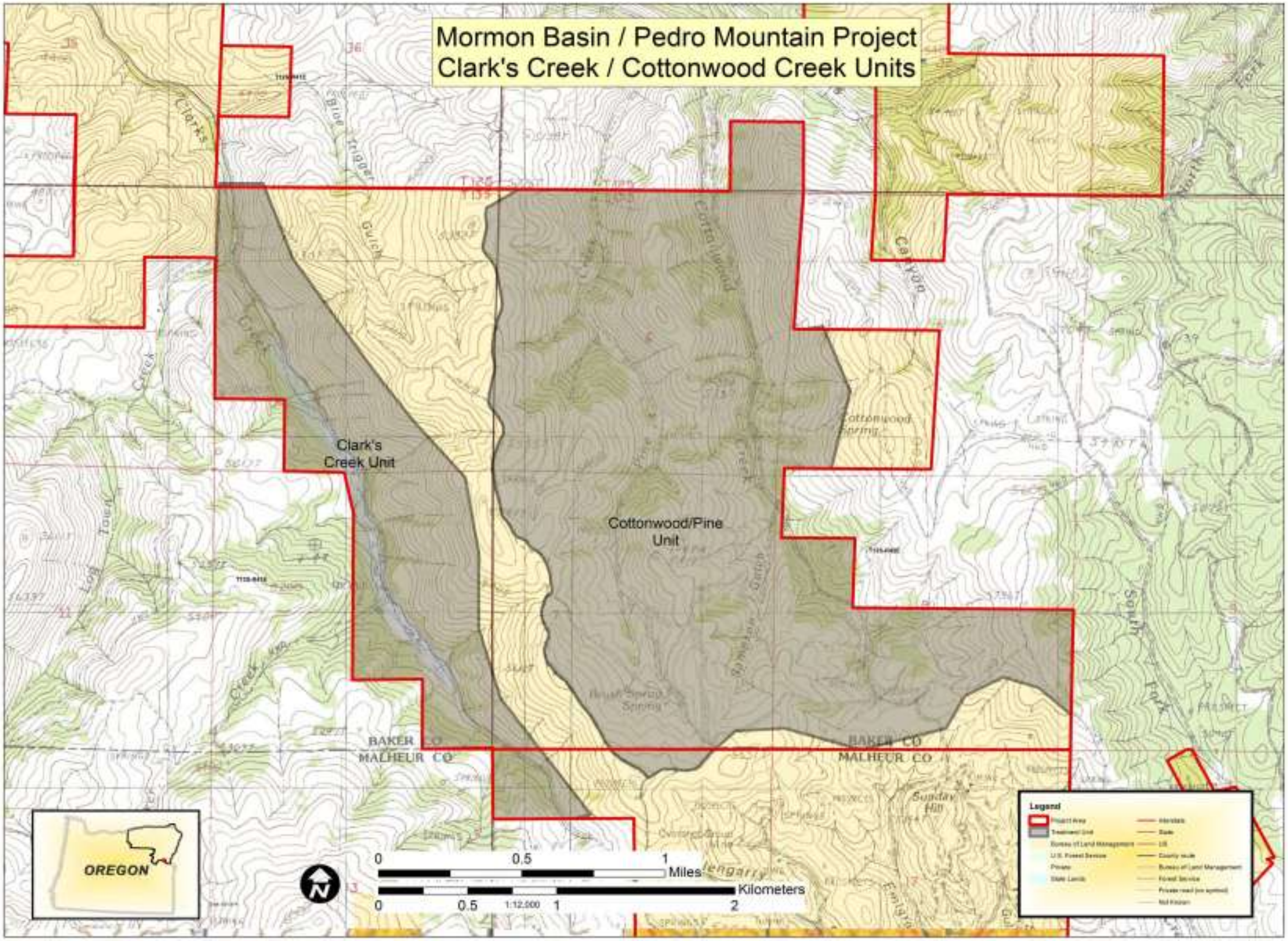


Figure 2.4 - Devils Canyon Unit

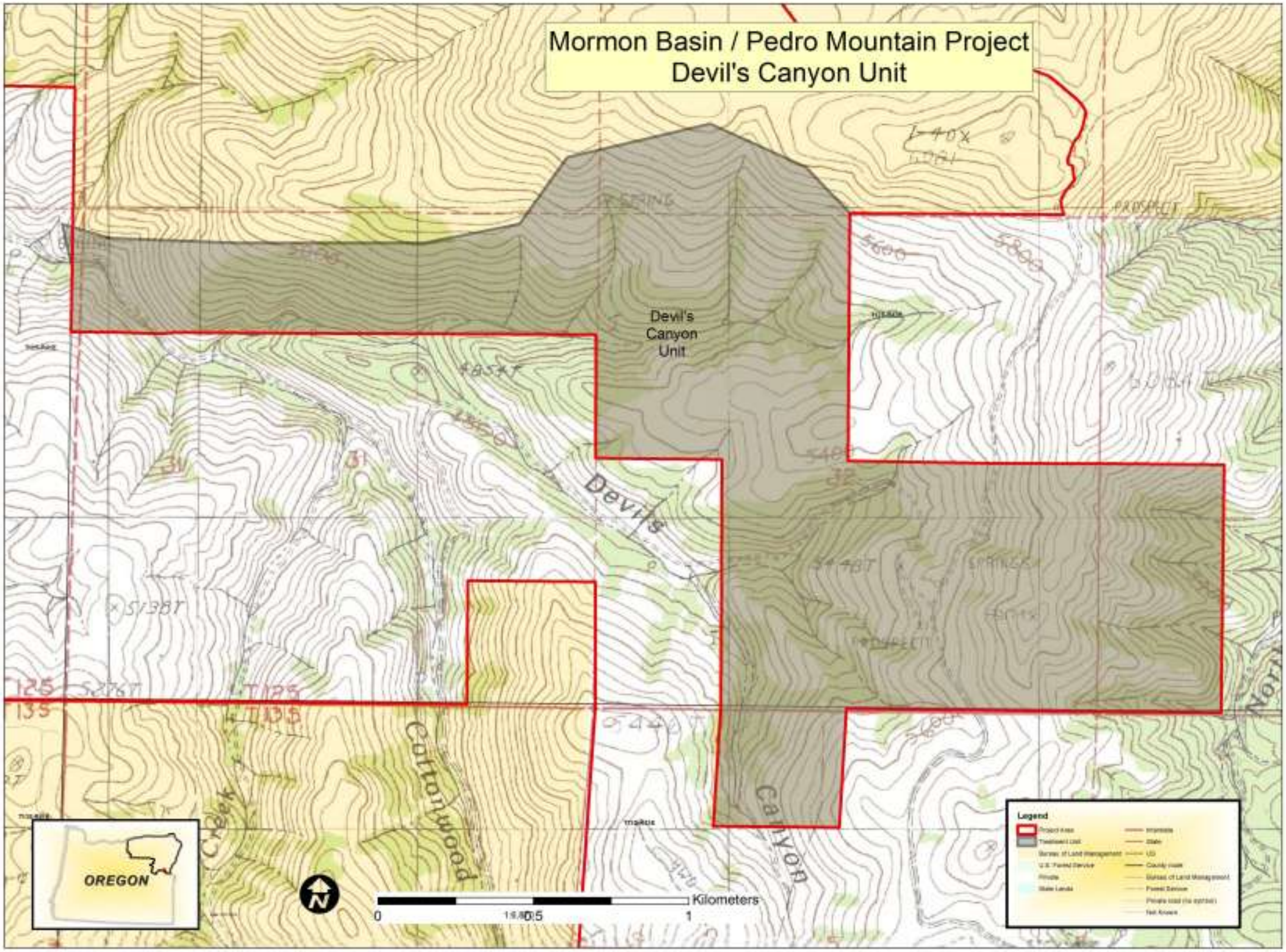


Figure 2.5 - Spirit Hill Unit

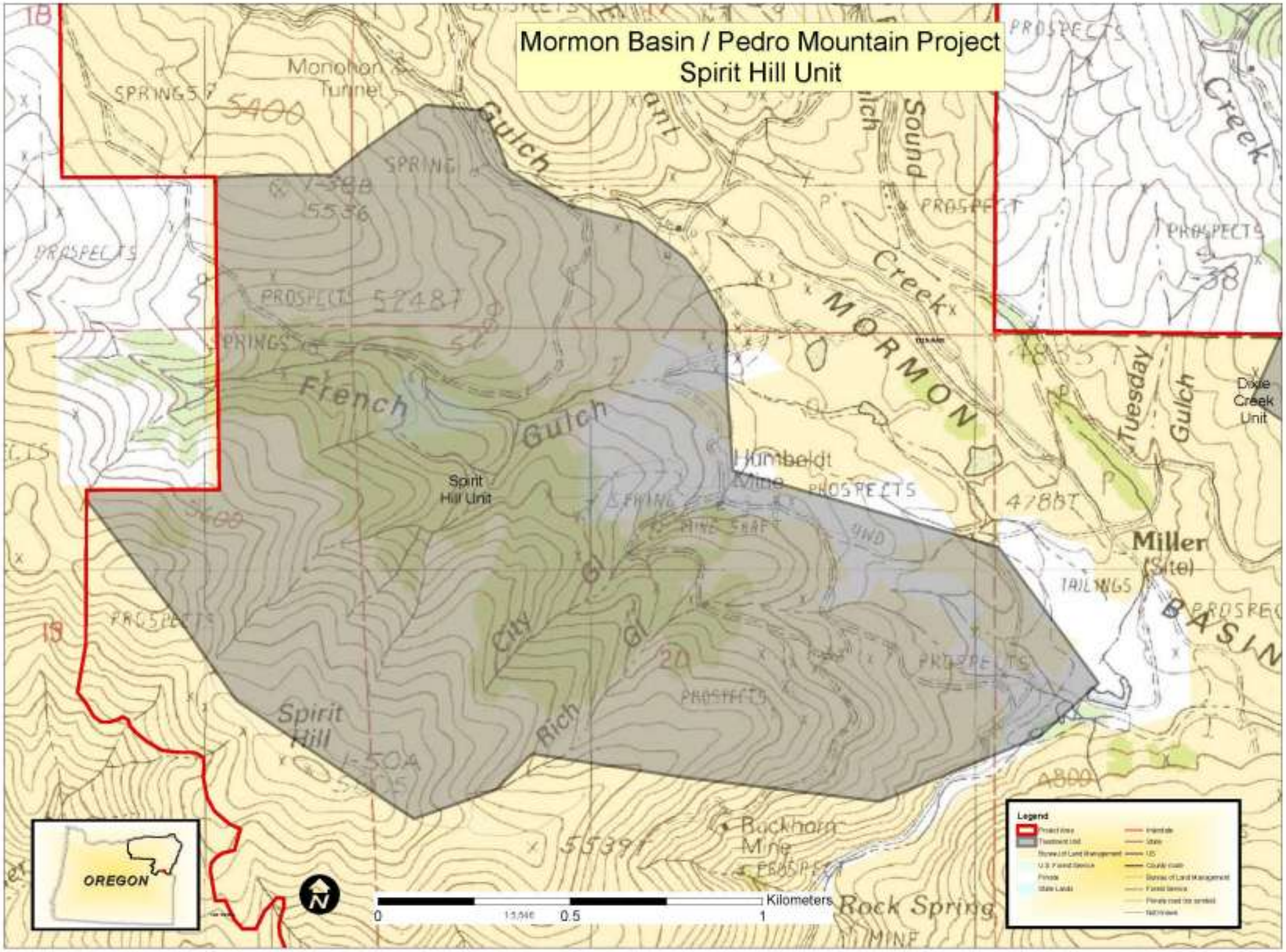
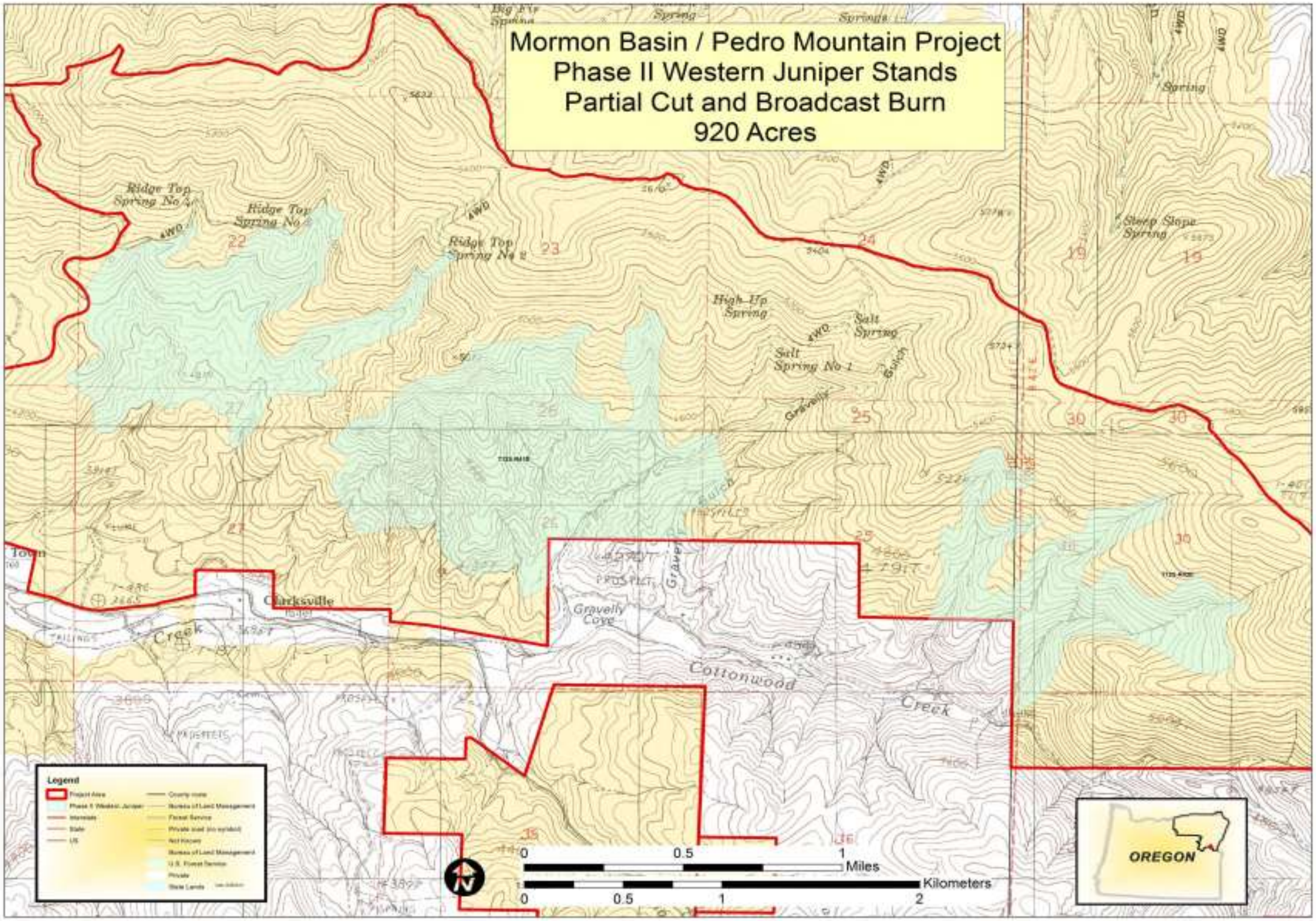


Figure 2.6 - Phase II Western Juniper Stands Partial Cut and Broadcast Burn



2.3.4 CONNECTED ACTION: CONSTRUCTION OF TEMPORARY ROADS AND IMPROVEMENT OF EXISTING ROADS

Actions that are considered connected to the broader Proposed Action include construction of less than three miles of temporary roads that would be needed to implement silvicultural thinning treatments. Existing roads would be utilized during implementation of all other treatment activities and up to 62 miles of road within and approaching the project area would require maintenance.

Figure 2.7 - A temporary road 2.5 years (top) and 5 years (bottom) after obliteration and decommissioning.
Photo Credit: USDA Forest Service

All temporary roads constructed in connection with the Proposed Action would be built outside of RMAs to protect riparian and aquatic habitat. Construction and utilization would only occur when soil moisture is low or in frozen conditions to reduce sediment delivery to streams. The temporary spurs would consist of minimally constructed, unsurfaced road between .04 and .06 miles in length. Most temporary road construction (more than 50%) required for implementation of the Proposed Action would occur in the Pedro Mountain area of the project and no roads built would cross a perennial stream or be placed parallel to a perennial stream. All temporary spurs would be constructed, used, and obliterated or decommissioned within a single operating season (see Project Design Elements for additional requirements and Fig. 2.7 for an example).

Road improvement to existing routes would occur throughout the project area and on roads used to access the treatment areas.

Road improvement would involve removal of bank slough or slides, blading and shaping of the road surface and shoulders, clearing of cattle guards, drainage ditches, and culverts of blockages and debris.

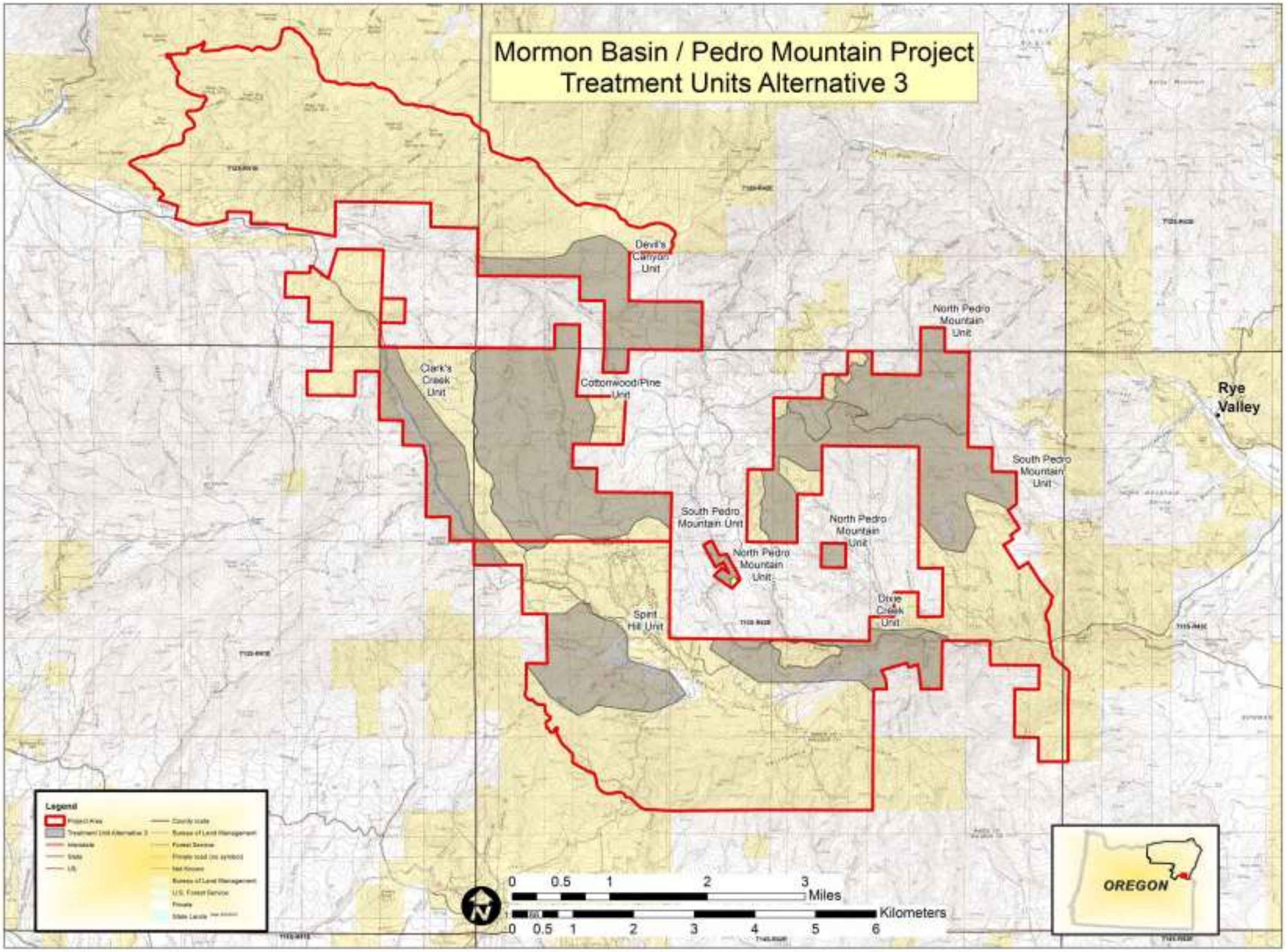
2.4 ALTERNATIVE 3: LOW IMPACT FUELS REDUCTION AND RESTORATION

This alternative to the Proposed Action was developed to focus on fuels reduction and restoration objectives described in the Proposed Action while limiting impacts to soils, maintaining current road densities, and restricting the use of herbicide to spot applications on discrete stands of noxious weeds.

Treatment units in the Proposed Action which require new temporary road construction would be eliminated from treatment in Alternative 3 to reduce potential soil disturbance within the project area (See Section 2.3.4 Connected Actions). This limitation would not allow construction of temporary roads and would therefore reduce the amount of silvicultural thinning described in the Proposed Action by 5-7% (Figures 2.7 and 2.8). Existing log skid routes and landings would be used where they exist and ground-based harvesting activities would be performed with low impact methods and equipment as much as possible.

Only spot applications of herbicide all together totaling less than 100 acres would be allowed for control of discrete stands of noxious weeds. Broadcast application of herbicide for annual grass control activity would not be used under this alternative and the sagebrush / bunchgrass restoration treatments described in the proposed action would not include objectives to reduce annual grass cover.

Figure 2.8 - Treatment Units Alternative 3



2.5 *PROJECT DESIGN ELEMENTS*

Project design elements are specific implementation requirements that maintain and improve identified resource conditions under the Proposed Action.

Cultural, Special Status Vegetation, Wildlife

- Protect cultural resource values throughout the life of the project. Archaeological sites would be avoided within the mechanical treatment units and activity generated fuels would not be piled within the boundaries of sites. Sites with combustible constituents would be protected during the deployment of prescribed fire by black-lining resources and use of appropriate ignition techniques. The District Fire Archaeologist would review burn plans prior to project implementation.

- Protect special status vegetation species throughout the life of the project. Special status plant populations would be avoided within mechanical and herbicide treatment units if necessary. Fire intolerant sensitive plants would be protected during deployment of prescribed fire by black-lining resources and use of appropriate ignition techniques. The District Fire Botanist would review all project implementation plans to ensure special status plant sites are appropriately protected.

- Minimize human disturbance in active northern goshawk nest areas between March 1st and September 30th.

- In hot/dry forests, retain at least two large (greater than 18 inches dbh, greater than 30 feet in height) snags per acre, and at least 3 large (greater than 12 inches diameter, greater than 7 feet in length) downed logs per acre. In warm/dry forests, at least 3 large snags per acre greater than 18 inches dbh with at least 5 large downed logs per acre would be retained.

- Invasive juniper would be treated aggressively within a two mile buffer around Greater Sage-Grouse leks. Treatment methods would be limited to cutting, pile burning, and jackpot burning within the lek buffer areas. Treatments within the buffered areas would not take place between March 1 and June 15.

- Avoid cutting of conifers with old growth characteristics or obvious wildlife occupation (cavities or nests). Protection of such trees during all prescribed fire operations.

Mechanical Silviculture Treatments

- Material hauled in all units would be restricted to dry or frozen ground conditions to prevent potential increases in sediment delivery to stream channels or wetlands.

- Ground-based thinning systems would not be used on slopes greater than 35%.

- Utilize previously constructed landings and skid trails to the fullest extent possible. Locate harvest facilities on existing disturbed sites such as roads, road shoulders, and borrow pits if existing landings and skid trails are not available. Landings should be located on level ground and should not require excavation.

- Utilize existing stream crossings (i.e., fords) where possible. New crossings would be approved by the fisheries biologist or other aquatic resource specialist(s).

- No ground-based heavy equipment would be utilized within a Riparian Management Area (RMA-see appendix C). Large diameter trees would be felled and left in place or removed with full suspension.

- Yarding activities would achieve full suspension over an active channel.

- Following skidding, skid trails would be assessed and rehabilitated as necessary by installing waterbars and/or employing methods that lift, fracture, and replace compacted soil to allow maximum infiltration of water.

- Where material during road excavation/grading would fall into or within RMAs, material would be end hauled (i.e., not sidecast) to suitable locations outside of RMAs.

- Prohibit storage and mixing of fuels and other chemicals, including refueling, within RMAs.

<u>Prescribed Fire</u>

- When using broadcast burning or underburning, ignition would occur outside of RMAs, although fire would be allowed to back into RMAs.

- When creating hand piles within RMAs, locate the piles a minimum of 25 feet from the top of the streambank or steep slope break adjacent to the stream channel or wetland.

- Rake and spread litter and surface fuels away from the bases of all ponderosa pine and Douglas fir trees retained in treatment areas that are 28" diameter at breast height (dbh) or greater. An area of bare mineral soil that is at least four feet in diameter would be created around each tree.

- Perennial grass seed may be applied with aerial/ground methods following prescribed fire on a case-by-case basis as monitoring data is gathered.

- Prescribed burning would follow the Oregon State Smoke Management Plan in order to protect air quality and reduce health and visibility impacts on designated areas.

- All burns would be planned based on either instructions given by, or in consultation with the Oregon Department of Forestry (ODF) and the State Implementation Plan (SIP) for prescribed fires and follow the Oregon State Smoke Management Plan.

- Livestock grazing may not occur for two growing seasons in portions of pastures that have been treated with broadcast burning, dependent upon monitoring results of fire intensity, vegetation recovery, and percentage of pasture burned. An additional season of rest from grazing may be necessary prior to a broadcast burn to allow for the development of a fine fuel ignition source.

- Pastures that have been treated with a jackpot burning treatment may be rested for a period of up to two growing seasons as monitoring results dictate to allow for recovery of understory species.

Roads, Weeds, and Hydrology

- Prior and following treatment of prescribed fire and mechanical treatment units, noxious weed populations in the area would be inventoried and spot applications of herbicide will be applied if necessary. All weed populations identified in the project area would be treated in accordance with the Vale District Integrated Weed Control Plan Environmental Assessment (EA No. OR-030-89-19 and the 2010 Vegetation Treatments Using Herbicides on BLM Lands in Oregon EIS.

- All vehicles and equipment used during implementation would be cleaned before and after treatments to guard against spreading noxious weeds.

- Cut and fill slopes would be designed at the normal angle of repose or less.

- Culvert outflow would not be discharged into unprotected fill slopes.

- Water crossing structures would be designed to provide for adequate two-way fish passage, 25-year frequency flows, and a minimum impact on water quality.

- Temporary roads would be designed with adequate drainage systems (i.e., dips, waterbars, cross-drains) to minimize erosion and sediment delivery into streams or wetlands.

- Plan for the stabilization of exposed soil and for rehabilitation of other environmental damage during temporary road construction (See section 2.35 Connected Actions and Fig. 2.7 for more information).

3 AFFECTED ENVIRONMENT

This section describes the existing environment of the proposed project area and how it may be affected by the Proposed Action. Table 3.1 summarizes the elements of the human environment that must be considered according to statute, regulation, policy, or executive order (BLM 2008 Appendix 1) as well as potential "unique characteristics of the geographic area" as outlined in the 2008 BLM NEPA Handbook.

Table 3.1 - Elements of the human environment and Regulatory Framework

Elements of the Human Environment	Status	Section	Authority or Designation
Areas of Critical Environmental Concern (ACECs)	Not Present	NA	43 CFR 1610.7-2
Air Quality	**Affected**	**3.1**	Clean Air Act, as amended
American Indian Traditional Practices	Not Affected	NA	American Indian Religious Freedom Act National Historic Preservation Act E.O. 13007 (Sacred Sites)
Cultural Resources	**Affected**	**3.6**	National Historic Preservation Act
Environmental Justice	Not Affected	NA	Executive Order 12898
Farmlands (prime or unique)	Not Present	NA	7 CFR 657.5
Flood Plains	Not Affected	NA	Executive Order 11988
Grazing Management	**Affected**	**3.7**	
Hazardous or Solid Waste	Not present	NA	Resource Conservation and Recovery Act of 1976 Comprehensive Environmental Response, Compensation, and Liability Act of 1980
Lands and Realty	Not Affected	NA	
Migratory Birds	**Affected**	**3.4.6**	Migratory Bird Treaty Act Executive Order 13186
Noxious Weeds	**Affected**	**3.5.2**	Executive Order 13112
Paleontology	Not Present	NA	
Recreation	**Affected**	**3.10**	
Resource Natural Area	Not Present	NA	
Riparian, Wetlands, and Water Quality	**Affected**	**3.2**	Executive Order 11990
Socioeconomics	**Affected**	**3.11**	
Soils	**Affected**	**3.3**	

Elements of the Human Environment		Status	Section	Authority or Designation
Special Status Species and Habitat	**Wildlife**	**Affected**	**3.4**	
	Plants	**Affected**	**3.5.3**	
	Fish	**Affected**	**3.4.7**	
Threatened or Endangered (T/E) Species or Habitat	Fish	Not Present	NA	Endangered Species Act 1973
	Wildlife	Not Present	NA	Endangered Species Act 1973
	Plants	Not Present	NA	Endangered Species Act 1973
Non-Forest Vegetation		**Affected**	**3.5.1**	
Forest and Woodland		**Affected**	**3.5.4**	
Fire Management		**Affected**	**3.8**	
Visual Resources		**Affected**	**3.9**	
Climate Change		**Affected**	**3.12**	
Wild and Scenic Rivers (WSRs) Wilderness		Not Present	NA	
Wilderness Study Areas		Not Present	NA	
Wilderness Characteristics		Not Present	NA	
Wildlife / Locally Important Species and Habitat		**Affected**	**3.4**	

3.1 AIR QUALITY

The project area is located within the U.S. Environmental Protection Agency (EPA), Region 10, Eastern Oregon Intrastate Air Quality Control Region. The air quality in the region is generally good and typical of large rural areas within the Great Basin and Owyhee Uplands. Wind measurements for the site have not been recorded. However, measurements have been recorded at Hereford, which lies approximately 28 miles northwest of Mormon Basin. Wind averages three miles per hour and generally blows from the southwest (USBR 2008).

The average annual precipitation is approximately 8.6 inches (records from October 1998 to October 2008) (USBR 2008). The average daily temperature over a similar period of time is approximately 45ºF (USBR 2008). The principal source of air contaminants in the project area is wind-blown dust generated from dry rangelands in the region and occasional traffic on the local native surface roads.

Under the Clean Air Act, BLM administered lands were given Class II air classification, which allows moderate deterioration caused by new pollution. The BLM will manage all public lands as Class II unless they are reclassified under the provisions of this Act. The Eagle Cap Wilderness, an area designated as a Class 1 airshed under the Clean Air Act (42 U.S.C. § 7475 (d)(2)(B)), is located within 47 air miles of the project area. Designation as a Class 1 airshed allows only very small increments of new pollution above existing air pollution levels.

Using historic wind data from the National Weather Service and the Morgan Mountain Remote Automated Weather Station, emissions from burning generally dissipate to the south and east of the project area, in the direction of the most common winds. Prevailing winds are come from the north, northwest, and west (48 percent) during the spring and fall (See Figure 3.1). Periods of degraded air quality can occur, though typically these events are short-lived. These events are usually associated with development of a stable air mass and/or cold air inversion over the area generating emissions. The greatest occurrence of such phenomena is during the winter months and less so during the spring and fall when prescribed fire will be implemented. Smoke from wildfires and to a lesser degree prescribed fires are also a considerable source of degraded air quality when they occur, primarily from particulate matter contained in smoke. Smoke from wood burning stoves can cause periods of degraded air quality during the winter heating season, usually associated with the stable air and/or inversion phenomenon mentioned above.

3.2 WATER QUALITY/WETLANDS RIPARIAN

The hydrologic analysis focused on surface water resources within six subwatersheds. The majority of the project area lies within the South Fork Dixie Creek, Clarks Creek, Basin Creek-Willow Creek, and North Fork Dixie Creek subwatersheds, with negligible portions in the Jeff Davis Creek-Willow Creek and Cave Creek-Burnt River subwatersheds. Perennial streams within the project area include Basin, Willow, Clarks, Cottonwood, Pine, Devils Canyon, Brinker, Deer, Emigrant, Dixie, North Fork Dixie, and South Fork Dixie Creeks.

Stream Flow

Streams and springs in the project area are not gauged. The closest gauges are on the Burnt River and they are no longer maintained. Past gauge records indicate that peak flows occur in late spring and are driven by snowmelt. Base flows are sustained by groundwater discharge and springs throughout the summer and fall.

Water Quality

Water quality of the streams in the project area has been influenced by a historic logging, mining, grazing, recreation, and farming practices. A search of Oregon's 2004/2006 Integrated Report Database produced several stream reaches listed as water quality limited for temperature, habitat modification, and flow modification. Basin, Willow, Clarks, Cottonwood, Dixie, North Fork Dixie, and South Fork Dixie Creeks are listed for temperature. BLM data collected in 2000-2003 and 2010-2012 show similar temperature trends.

Stream and Riparian System Stability

Basin Creek has been and continues to be altered by mining operations in its upper reaches leading to an overwidened, depositional channel. Where the stream gradient steepens, it is perennial, incised, and entrenched. Riparian vegetation includes birch (*Betula occidentalis)*, aspen (*Populus tremuloides)*, cottonwood (*Populus trichocarpa)*, and early seral herbaceous species. Around the spring at the headwaters and along the upper tributary to Basin Creek, encroachment by conifers is evident and may be limiting riparian regeneration. Several weedy species are present.

Clarks Creek channel and riparian areas have been influenced by historic grazing and mining activities. On both private and BLM, previous mining and grazing has altered banks and increased sedimentation leading to overly widened, poorly defined, depositional channels. These activities maintain early seral riparian communities dominated by willow (*Salix lasiandra)*, Kentucky bluegrass (*Poa pratensis)*, and fowl mannagrass (*Glyceria striata)*. Age class distribution is heavily weighted with young plants. In areas of valley confinement, the Rosgen channel types are A and B, exhibiting erosional features, low sinuosity, and low width: depth. Riparian communities here are in good condition. They exhibit multiple age-classed gray alder (*Alnus incana),* Pacific willow (*Salix lasiandra),* and conifer species. The road contributes to channel confinement and is a source of sediment. In areas with active mining, riparian communities are early seral due to recurring ground disturbance and high sedimentation. Grazed areas along Clarks Creek vary from poor to good condition based on bank stability, channel definition, and riparian vegetation age class structure, cover, and vigor.

Cottonwood and Pine Creeks are springfed streams influenced by grazing, mining, logging, road building and road maintenance activities from their headwaters to their respective confluences with Devil's Canyon and Cottonwood. The BLM established a riparian monitoring site on Cottonwood in 2010 to document channel and riparian condition in the area. Above the Samper Gulch road, the valleys are wide relative to creek width. Here, the channels moderate channel gradients, low sinuosity, and high width: depth and are consistent of stable streams for their landscape position. Below the Samper Gulch road, Pine Creek has a dam and two flow control structures associated with mining in the lower half of the valley. The dam spans the valley and ponds water, yet is porous enough to allow perennial flow via toe slope seepage. Large woody debris is abundant and aids in channel stability. While the majority of the banks are stable, the channels are overly wide in areas where cattle have trampled banks. Below Samper Gulch road the Pine and Cottonwood valleys narrow and their channels become incised and entrenched. The riparian vegetation is composed of colonizing herbaceous species. There is adequate cover, vigor, and reproduction of the herbaceous component; however desirable riparian species are underrepresented. Woody species are dominated by encroaching and increase in density and cover in the downstream direction.

Devils Canyon is mostly on private land. It is springfed and heavily influenced by grazing, historic logging, road building and road maintenance operations from the headwaters to the Cottonwood confluence. BLM established a riparian monitoring site in 2010 to document channel and riparian condition in the area with the first repeated measurements slated for 2015. The valleys are wide relative to creek width. The channel has a steep gradient with minimal bank development. There are several headcuts stabilized by rock and large woody debris. Cobble and gravel substrate indicates peak flows with high stream power and an erosive environment. Riparian vegetation is composed of mid seral, facultative species. There is moderate cover, vigor, and reproduction. Heavy grazing keeps the riparian zone from fully functioning to protect banks, dissipate flood energy, and recharge floodplain water stores. There is little evidence of regenerating riparian woody species. This stream is vulnerable to erosion.

South Fork Dixie Creek is the largest stream in the project area. This channel is influenced by grazing, historic logging, road building, road maintenance, and recreation. Like other streams in the project area, this stream is in a valley that varies from confined to unconfined. BLM established a riparian monitoring site in 2010 to document channel and riparian condition in the area. The channel is incised and entrenched and has a steep gradient. Stream banks are actively eroding along 30% of its length. Woody species in this drainage showed adequate age class distribution. Riparian herbaceous species exhibited adequate cover, vigor, and reproduction. This stream is vulnerable to erosion.

3.3 SOILS

The following soils information is from the Baker County Soil Survey (NRCS 1997). The project area is comprised of over 15 different soil types. For the portion of the project which is located in Malheur County, a soil survey has not been completed and as such the information presented below is for Baker County only. There are thirteen main soil units which contain most of the different soil types and the majority of the acreage within the project.

Of the 15 main soil units, three make up over 5500 acres of the project area. They include Ateron-Roostercomb (35-60% slopes), Roostercomb-Longbranch Complex (12-35% slopes), and Piersonte soil units. These soils are extremely gravelly clay loams and very channery loams, on moderate to steep slopes, and moderate depth to bedrock. They have moderate to very high water erosion hazard ratings. Based on soil texture, rock content, and thickness of productive soil layers, compaction hazard for these soil units is moderate to severe. Based on slope and thickness of productive soil layers, displacement hazard for these soil units is moderate to severe.

The remaining ten soil units make up the majority of the remainder of the project area. They include Ateron-Roostercomb (12-35% and 2-12% slopes), Kilmerque , Dogtown complex, Roostercom-Longbranch Complex, Taterpa, Lostbasin-Xerorthents-Rock outcrop complex, Bouldrock complex, Bouldrock, and Sinker soil units. These soils have rocky loam, clay loam, and silt loam textures. While some slopes are gently sloping, the majority of these soils are found on slopes ranging from 35-60%. The depth to bedrock or impervious layers for most of these soils is 20-40 inches. Based on soil texture, rock content, and thickness of productive soil layers, compaction hazard for these soil units is severe. Based on slope and thickness of productive soil layers, displacement hazard for these soil units is moderate to severe.

Roads within the project area include three county roads (Basin Creek Road, Mormon Basin Lane and Clarks Creek Road) and numerous primitive roads. Road densities range from 1.92 to 2.39 road miles per square mile.

3.4 Fish and Wildlife

Fish and wildlife resources include special status fish and wildlife, fisheries, terrestrial wildlife, and neotropical migratory birds.

Endangered Species Act Considerations (Endangered and Threatened Wildlife Species)

There are no known threatened or endangered species within or adjacent to the project area.

BLM special status wildlife and species of local importance

A special status species is an animal or plant species identified by the BLM for which species viability is a concern either 1) because of these species are predicted downward trend in population numbers or density, or 2) because of current or predicted downward trends in habitat capability that would reduce a species' existing distribution. There are six BLM special status wildlife species known to breed on public land, uses public land for part of their life history requirements, or has potential habitat located within the project area. These species include: Greater Sage-Grouse, bald and golden eagle, Townsend and pallid bat, and fringe myotis. Within the project area there are also species of local importance which are species that typically have no federal designation for conservation, but are important to tribes and other public interests within this project area these wildlife species are elk, deer, and northern goshawk.

3.4.1 **Greater Sage-Grouse**

Within this analysis the Oregon Conservation Strategy (ODFW 2011), 12 month finding from USFWS (USFWS 2011), and Greater Sage-Grouse monographs (Connelly et al. 2011) were used to develop alternatives and design features as well as contribute to the scientific background of this species. Greater Sage-Grouse (hereafter referred to as sage-grouse) represent a focal species for sagebrush conservation because they are sagebrush obligates that select habitats at multiple spatial scales (Stiver et al 2010).The sage-grouse is highly dependent upon the presence of sagebrush, notably Wyoming, mountain big, basin big, low and stiff sagebrush. The vegetative community within the project area that can support sage-grouse life history consists of mountain big/basin big sagebrush with an understory of bluebunch wheatgrass, Idaho fescue, and bottlebrush squirrel tail which is capable of providing the vegetation structure needed for nesting (Braun et al 1977; Braun et al 2005; Connelly et al 2004). These grasses are also important in providing screening cover for brood-rearing (France et al 2008). Sagebrush density and structure is especially important during winter (Homer et al 1993). Areas that have denser canopy cover or sagebrush that is at least 10-12 inches above snow level would provide both food and cover for wintering sage-grouse within project area (Hagen 2005; Hagen 2011). Alternatively, low sagebrush may also provide some wintering habitat if sagebrush is kept clear of snow (Hagen 2005). In general, sage-grouse would use western or southern facing aspects that have at least 20 percent density sagebrush cover (Homer et al 1993).

The BLM has classified sage-grouse habitat into two categories Preliminary Primary Habitat (PPH) and Preliminary General Habitat (PGH). The PPH areas that have been identified as having the highest conservation value to maintaining sustainable sage-grouse populations. These areas would include breeding, late brood-rearing, and winter concentration habitat. The PGH areas of occupied seasonal or year-round habitat outside of priority habitat and have less management implications associated with it. Within the Mormon Basin/Pedro Mountain Fuels Management Project there are approximately 2,505 acres of PPH representing 16 percent of the total project area and 3,313 acres of PGH or 22 percent of the total project area. There are no known leks within the project area and the closest sage-grouse lek is located on private land approximately two miles away from the project boundary; the closest BLM lek is southeast, approximately three and a half miles from the project boundary.

3.4.2 EAGLES (BALD AND GOLDEN)

Both bald and golden eagles are large birds and are members of the booted or true eagle family. Habitat destruction and degradation, illegal shooting, and the contamination of its food source, largely as a consequence of DDT, decimated the eagle population. Bald and Golden eagles are protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Act (Eagle Act).

Bald eagles

There are no known bald eagle nest or roost sites within the project area. Records show that the nearest bald eagle nest is 25 miles away at Unity Reservoir.

Potential habitat is present within the project area. Habitat requires a good food base, perching areas, and nesting sites. Their habitat includes estuaries, large lakes, reservoirs, rivers, and some seacoasts. In winter, the birds congregate near open water in tall trees for spotting prey and night roosts for sheltering. In treeless regions, they may also nest in cliffs or on the ground. The birds travel great distances but usually return to breeding grounds within 100 miles of the place where they were raised. Bald Eagles were removed from the endangered species list in August 2007 because their populations recovered sufficiently. Oregon is home to over 470 breeding pairs and has met the recovery zone goal in this area.

Golden eagles

Review of the BLM Geographic Biotic Observations or GeoBOB data base shows 1 golden eagle sighting within the project area. There are no Golden eagle nest or roost sites within the project area. The Mormon Basin/Pedro Mountain project area has potential habitat capable of supporting for their life history needs and will be continued to be monitored. Large trees and cliff sites are located throughout the project area.

Golden eagles build nests on cliffs or in the largest trees of forested stands that often afford an unobstructed view of the surrounding habitat. Golden eagles avoid nesting near urban habitat and do not generally nest in densely forested habitat.

3.4.3 **BATS**

Fringe myotis

The fringed myotis is a BLM special status species. Trapping has occurred in the Rooster comb area adjacent to the project area, but no fringed myotis were found, although potential habitat is available. Little is known about the fringed myotis and its life history. This bat is named for a noticeable fringe of stiff straw-colored hairs on the trailing edge of the tail membrane. They are thought to emerge about two hours after sunset to feed on various insects by foraging along waterways or above the canopy of the vegetation. Females congregate in nursery colonies to give birth to a single young which is born hairless. Even though breeding occurs in the fall, the egg is not fertilized nor does development of the fetus begin until the spring. the young develop very rapidly and can fly within 20 days. The fringed myotis roosts in caves, abandoned buildings, rock crevices, and trees.

Pallid bat

The Pallid bat is a BLM special status species. Trapping has occurred in the Rooster comb area adjacent to the project area, but no Pallid bats were found, although it potential habitat is available. Pallid bats are found in arid deserts, juniper woodlands, grasslands, and sagebrush shrub-steppe, which often have a rock outcrop component with water nearby. They are less abundant in evergreen and mixed conifer woodlands however they would still utilize edge habitat that have this characteristic (Crampton and Barclay 1998) . They typically roost in rock crevice, less often in caves, tree hollows, and in abandoned mines. The lack of information on this species makes development and implementation of any effective management activity difficult. Roosting habitat often favored by this bat (i.e. crevices in cliffs and rock outcrops) provides protection from many kinds of disturbance. Nevertheless, any roosts that are discovered should be protected. Studies to fill the gaps in our knowledge of this bat in Oregon are needed, especially surveys throughout the state in appropriate habitats and landscapes to determine the full extent of its distribution. The most immediate management action that can benefit this species (and other bat species as well) is protection of water sources in arid regions where this bat is present and water sources are limited.

Townsend’s bat

The Townsend’s bat is a BLM special status species. Trapping has occurred in the Rooster comb area adjacent to the project area, but no Townsend’s bats were found, although it potential habitat is available. Townsend's big-eared bats will use a variety of habitats, almost always near caves or other roosting areas (Sherwin et al. 2000). They can be found in pine forests and arid desert scrub habitats. When roosting they do not tuck themselves into cracks and crevices like many bat species do, but prefer large open areas. The response by Townsend's big-eared bats to human activities is largely undocumented in Oregon. Abandoned mines should be surveyed for Townsend's big-eared bats or other bat species prior to any reclamation activity.

Although there are no formal recordings for bats in GeoBOB, these bats have adapted to numerous environments occupying a large variety of ecological habitats from sagebrush steppe to mesic mixed forests. This project area is well within their distribution and breeding range of the species and offers a variety of natural structures for their life history needs. Trapping has occurred in the Rooster comb area adjacent to the project area, and Townsend's bats were found.

3.4.4 DEER AND ELK

Elk and deer are species of local importance. They are the most prevalent big game species in the project area and are an indicator of the quality and diversity of general forested habitat. Elk exploit a variety of habitat types in all successional stages and use patterns change both daily and seasonally. There are two species of deer that are found within the project area (mule deer and whitetail deer). The project area offers quality forest habitat which provides varying quality of summer and wintering habitat for deer and elk.

The project area is within designated wintering habitat for both elk and deer is currently being encroached by western juniper. Although juniper encroachment increases hiding cover for big game it also reduces or alters available forage that is available for these species. Summer habitat is currently being changed with the expansion of western juniper and other conifers.

3.4.5 NORTHERN GOSHAWK

Although the Northern goshawk is a species of special of local importance because of its past designation of being BLM sensitive and its association of being an indicator species with forested communities. Available evidence suggests the distribution of goshawks in the northern and western portions of its range is relatively unchanged since settlement by Europeans (USFWS 1998). Goshawks are highly mobile and have large home ranges. Nest sites may be limited to portions of a landscape not already occupied by other pairs, but that also contain the landscape structure and pattern comprising suitable with nest habitat.

For a typical northern goshawk they need approximately 30 acres that would support their nest site, 420 acres for fledglings, and up to 5,400 acres for their foraging home range (Reynolds et al. 1992). Habitat management recommendations include two large snags per acre and at least three large diameter downed logs for their life history needs.

There are no formal GeoBOB recordings of goshawks within the project area. However, there is structure that would support the habitat needs of goshawks. The nearest record for goshawk is approximately five miles away from the project area.

3.4.6 NEOTROPICAL MIGRATORY BIRDS

Landbirds, including neotropical migratory birds (NTMB), were analyzed based on high priority habitats identified in the Oregon-Washington Chapter of Partners in Flight, Northern Rocky Mountains Bird Conservation Plan (Altman 2000). While no official NTMB surveys in the project area, the Oregon Breeding Bird Atlas (Adamus et al. 2001) includes observational data for this area. Neotropical migratory birds breed in temperate North America and spend the winter primarily south of the United States-Mexico border. Of the 225 migratory birds that are known to occur in the western hemisphere, about 102 are known to breed in Oregon. They include a large group of species, including many raptors, cavity excavators, warblers and other songbirds, with diverse habitat needs spanning nearly all plant community types and successional stages. Long-term population data on many of these birds indicate downward population trends although not all species populations are declining (Altman 2000). Habitat loss is considered the primary factor in decline of neotropical migratory birds.

This project area provides habitat for neotropical migratory landbirds (birds that migrate that are not waterfowl or birds associated with wetlands) that prefer riparian and dry mixed-conifer stands. Migratory bird species use suitable habitat in this area for nesting, foraging, and resting as they pass through on their yearly migrations.

3.4.7 FISHERIES

Fish species that may be present in the project area include redband trout (*Oncorhynchus mykiss gairdneri*) and/or rainbow trout (*Oncorhynchus mykiss*). Redband trout are listed as a sensitive species with Oregon Department of Fish and Wildlife (ODFW) and the US Department of Fish and Wildlife. Redband trout presence has been verified in Clarks, Cottonwood, Deer, and South Fork of Dixie Creek. No anadromous fish are found in the project area. Although historically present in the project area, bull trout (*Salvelinus confluentus*) have not been documented in the Burnt River subbasin since the construction of the Brownlee Dam in 1958 (Nowak 2004). Also, bull trout have not been documented in the relevant subwatersheds of the Willow Subbasin.

Redband trout have been recently classified into the rainbow trout grouping *Oncorhynchus mykiss gairdneri*. Redband trout are the interior (inland) rainbow trout species. Inland redband trout coloration is highly variable, but most often there is a brick-red coloring around the lateral line and dark colored parr marks (spots) along the entire body. By comparison, coastal rainbow trout have a rainbow coloring around the lateral line and light colored parr marks along the body. Redband trout spawning behavior appears to be most similar to that of rainbow and golden trout, which are all spring spawners and require gravel riffles in which the female excavates a redd (Behnke 1992). Redband trout have been listed as a sensitive species (BLM) and a species of concern (ODFW and USFWS) in Oregon because their population levels have diminished from historical levels. Currens (1991) looked at the genetic variation within and among populations of redband trout in the Burnt and Powder rivers, which showed consistent genetic characteristics to that of inland redband trout within the Columbia and Snake rivers.

Redband trout are similar to brook trout (*Salvelinus fontinalis*) in terms of requirements for food, space, cover, and individual territories afforded by the riffles and small pools of headwater streams (Bacon et al. 1980). However, redband trout appear to tolerate higher siltation conditions and select lower water velocity situations than what is typical for most trout. Redband trout also appear to be more tolerant of higher water temperatures than most other salmonids. Some redband trout populations in the desert basins of southeast Oregon have adapted to very high water temperatures through a unique survival mechanism and are known to inhabit intermittent, stagnant streams with temperatures as high as 83° F (Behnke 1979). Redband trout mature between 1 and 5 years of age with most maturing at age 3. They spawn mainly in the spring although studies of other inland populations as well as field investigations indicate that redband trout spawn throughout the year where water conditions allow (ODFW 1993). This is most likely to occur in spring-fed systems where water temperature is essentially constant. Redband trout in the Burnt River subbasin exhibit resident, fluvial (adult life spent in rivers) and adfluvial (adult life spent in lakes) life histories in various locations in the subbasin depending, in part, on the presence of passage barriers.

3.5 VEGETATION

Vegetation within the Mormon Basin / Pedro Mountain project area consists of forested and non-forested types. Non-forested vegetation includes mountain big sagebrush/bunchgrass communities between 4,000 and 6,200 feet in elevation with a Wyoming big sagebrush and basin big sagebrush communities occurring at lower elevations (> 4,500 feet in elevation). Forest and woodland vegetation includes hot-dry ponderosa pine stands between 4,000' and 5,000' in elevation and warm-dry mixed conifer stands between 5,000' and 6,200' feet in elevation. Riparian vegetation, pockets of aspen and curlleaf mountain mahogany are also present. Plant communities within the project area are summarized below.

3.5.1 **NON-FOREST VEGETATION**

Non-forest vegetation includes sagebrush steppe ecological communities and riparian/aspen communities that occur in large contiguous areas outside of the defined silvicultural treatment areas, and in isolated pockets within many of the silvicultural treatment units.

Nearly all non-forest vegetation within the project is being affected by conifer encroachment to some extent. Vegetation within the project area is dominated by big sagebrush (*Artemisia tridentata vaseyana*, *tridentata* and *wyomingensis*), and stiff sagebrush (*A. rigida*). The Big sagebrush predominates with only a few islands of stiff sage.

Presence of stiff or big sagebrush is dependent on soil type and depth. Stiff sagebrush is most often found on shallow soils with either a restrictive layer or bedrock within twelve inches of the soil surface. Stiff sagebrush sites tend to be low to moderately productive because of shallow soils. Stiff sagebrush occupies slightly lower productivity sites with shallower soils with more rock on the surface. Herbaceous species found in association with stiff sagebrush includes bluebunch wheatgrass, Idaho fescue, Thurber's needlegrass, bottlebrush squirreltail, and Sandberg's bluegrass.

Deeper soil areas are dominated by one of three subspecies of big sagebrush including basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), and mountain big sagebrush (*Artemisia tridentata* ssp *vaseyana*). These sagebrush species are usually associated with deeper soils compared to low sagebrush species. Herbaceous plant composition is similar to other sagebrush types, but mountain big sagebrush plant communities tend to have a higher density and cover of large perennial grasses and deep-rooted perennial forbs.

3.5.1.1 Mountain Big Sagebrush / Perennial Bunchgrass

Within the project area there are approximately 7,500 acres of mountain big sagebrush/perennial bunchgrass. This vegetative community occurs primarily above 4500 feet in elevation and includes areas of low sagebrush found on more shallow rocky soils. Mountain big sagebrush occurs on sites that are more productive than those associated with Wyoming big sagebrush. Soils are often deep, well drained on mountain slopes. Plant diversity and productivity is greater than on Wyoming big sagebrush sites. Herbaceous plant composition is similar to other sagebrush types, but mountain big sagebrush plant communities tend to have a higher density and cover of large perennial grasses and deep-rooted perennial forbs. Perennial grass species within this plant community include bluebunch wheatgrass and Idaho fescue.

Ponderosa pine, Douglas fir, and western juniper are present and expanding throughout the mountain big sagebrush communities within the project area. As the density of conifers increases there is a corresponding decrease in the cover of mountain big sagebrush and associated understory grasses and forbs.

The exotic invasive plant, cheatgrass, is present as small inclusions of less than 3% foliar cover. The cheatgrass inclusions are small and limited to south aspects in areas of past disturbance, such as roads, trails and livestock concentration areas. Mountain big sagebrush is more resistant to the invasion of non-native annual grasses than Wyoming, three tip, and basin big sagebrush community types (Bunting et al. 1987; Ypsilantis 2003).

Primarily where this plant community is found on north aspects, mountain mahogany, antelope bitterbrush and other mountain shrubs are found in small stands and as individual shrubs. Mountain shrubs also exist as a forest understory component and as shrub stands that can range from mixed to pure composition. Antelope bitterbrush can also be found throughout southern aspects as well. In many cases, mahogany and bitterbrush shrubs are decadent with a substantial dead component. Competition from western juniper and ponderosa pine for light and water is contributing to the decline of both species.

3.5.1.2 Low Elevation Sagebrush / Perennial Bunchgrass

Wyoming big sagebrush generally occurs on drier sites than mountain big sagebrush, many times adjacent to basin big sagebrush found on deeper soils and low sagebrush found on shallow, rocky soils. The associated plant community is often less diverse than mountain or basin big sagebrush plant communities due to shallower soil and less precipitation. There are approximately 1500 acres of Wyoming big sagebrush/perennial bunchgrass vegetation within the project area. This vegetative community is located primarily below 4,500 feet in elevation. Perennial grass species within this plant community include bluebunch wheatgrass, Sandberg’s bluegrass, and bottlebrush squirreltail.

Western juniper is expanding into the Wyoming big sagebrush communities in the project area reducing the extent and cover of Wyoming big sagebrush and associated understory species.

Wyoming big sagebrush is highly susceptible to conversion into a non-native annual grass community (Bunting et al. 1987). The exotic invasive plant, cheatgrass, is also present throughout the Wyoming big sagebrush plant communities. Infestations of cheatgrass are primarily heaviest along roads and trails, and on southern aspects. Within the lower elevations of this vegetative community cheatgrass is more prevalent with up to 20 percent foliar cover.

3.5.1.3 Western Juniper

Western juniper is found throughout the project area and can be found encroaching into all vegetation types in the project area. The encroachment is often associated with mountain big sagebrush. Miller and others (2005) believe expansion of western juniper into mountain big sagebrush plant communities of eastern Oregon began in the late 1870s. Research conducted nearby on Steens Mountain in Harney County, Oregon, found that over 90 percent of the current standing trees began growth prior to 1900 (Miller and Rose 1995). The expansion of western juniper has occurred at the expense of associated vegetation. Miller, Bates, Svejcar, Pierson and Edelman (2007) identified three transitional phases of western juniper development.

Phase I – juniper are present but shrubs and herbs are the dominant vegetation that influence ecological processes (hydrologic, nutrient and energy cycles) on the site.

Phase II – juniper are co-dominant with shrubs and herbs and all three vegetation layers influence ecological processes on the site.

Phase III – juniper are the dominant vegetation and the primary plant layer influencing ecological processes on the site.

Most of the western juniper stands within the project area are in Phase I. Lesser portions of the project area are in Phases II and III. The total time to move from Phase I to Phase III varies by site, but Miller and Rose (1999) estimate a western juniper stand approaches canopy closure within 70 to 90 years of tree establishment on productive sites and 120 to 170 years on drier sites.

Locally pockets of old-growth junipers occur, generally in areas with sparse surface fuels. These trees are generally characterized as having an irregularly shaped crown, partially dead areas of the canopy and main trunk, deeply furrowed bark, yellow to yellow-green lichen in canopy, cavities in trunk, and big limbs. Understory plants include sagebrush, Bluebunch wheatgrass, Sandberg bluegrass, and a number of perennial and annual forbs.

3.5.1.4 Riparian/Aspen Vegetation

Within the project area there are numerous scattered aspen stands and riparian communities. Vegetation within these areas includes wet and mesic meadows dominated by herbaceous vegetation and reaches dominated by willows or aspen. Nearly all of the aspen and riparian vegetation is being encroached by conifers. The encroachment has led to decadent stand conditions in both aspen and riparian vegetative stands. Competition, from the encroaching conifer trees for light, water, and nutrients, has resulted in the current decadent condition of these two vegetation communities.

3.5.2 NOXIOUS WEEDS

Noxious weeds and invasive plants are present in the project area. These plants generally occur throughout the project area in areas of disturbance such as livestock developments and concentration areas, mining areas, and along roads and trails. An intensive noxious weed inventory and chemical treatment was conducted in the Devil's Canyon and Clark's Creek units in 2009. Though several species were found and were widely scattered across the units, most existed over very few acres total. Scotch thistle (*Onopordum acanthium*)was the most widely encountered weed, occurring over approximately 19 acres. Other weeds encountered include whitetop (*Cardaria spp.*), spotted knapweed (*Centaurea stoebe*), diffuse knapweed (*Centaurea diffusa*), Canada thistle (*Cirsium arvense*), bull thistle (*Cirsium vulgare*), houndstongue (*Cynoglossum officinale*), leafy spurge (*Euphorbia esula*) and Mediterranean sage (*Salvia aethiops*), each occurring on less than two acres. Cheatgrass (*Bromus tectorum*) and medusahead (*Taeniatherum caput-medusae*) were readily observed, though not specifically mapped in the inventory.

This suite of weeds and their level of abundance is characteristic of the other units in the project area, especially in the non-forested sagebrush/bunchgrass community types. Yellow toadflax (*Linaria vulgaris*) has been observed in the Cottonwood/Pine unit. Ongoing inventories and treatments have occurred in the Mormon Basin and Sunday Hill areas, primarily associated with mining projects and main roads.

3.5.3 SPECIAL STATUS PLANTS

Vegetation Existing Condition

The project area consists of sagebrush steppe, canyon grassland, riparian areas, dry coniferous forest, lithosols, and aspen plant communities. Slopes are highly variable in the project area. Old stumps are common throughout the project area from historic logging. Biological soil crusts are rare throughout the project area due to poor habitat (shrink swell clays) as well as historic past disturbances of logging, mining, and ongoing current disturbance of livestock grazing. The area also has a long history of mining activity and historic human settlements that have both added to the disturbance of the area.

Special Status Plants Previously Documented Within or Near the Project Area

The rare species databases for WA/OR BLM GeoBOB (Geographic Biotic Observations), ORBIC (Oregon Biodiversity Information Center), and the Forest Service's NRIS (Natural Resource Information System) were all examined to determine previously documented special status plant locations within or in close proximity to the project area. There are no federally listed threatened or endangered plants known to occur in the project area. Although there is one historical record for Howell's spectacular thelypody (*Thelypodium howellii* ssp. *spectabilis,* a federally listed Threatened plant species) which was historically known to occur in Cow Valley, Malheur County, which is within 10 miles of the project area. This is based upon herbarium collections, the most recent of which was in 1969. There is a small potential for Howell's spectacular thelypody to occur along Clark's Creek in the project area. This is the only area in the proposed project area that may have the low elevation mesic alkaline habitat preferred by Howell's spectacular thelypody. There is no potential habitat in the proposed project area for either Macfarlane's four o'clock (*Mirabilis macfarlanei*) or Spaulding's catchfly (*Silene spaldingii*). Macfarlane's four o'clock is suspected to occur on the Baker Resource Area (BRA) and Spaulding's catchfly is documented to occur on BRA. Both Spaulding's catchfly and Macfarlane's four o'clock are federally listed Threatened plants.

In addition, there are no special status plants previously documented to occur in the project area. There is one previously documented occurrence of rustic paintbrush (*Castilleja flava* var. *rustica*) and forty-two locations of Snake River goldenweed (*Pyrrocoma radiata*) within ten miles of the project area. There are no records of prior special status plant surveys in the project area. Thus, the distribution and abundance of special status plants in the project area is not known.

Potential Special Status Plants within the Project Area

The following plant species have potential to occur within the proposed project area based upon habitats present in the project area and habitat preferences of these special status plants. This includes the two special status plant species that were previously documented to occur within 10 miles of the project area.

Table 3.2 - Potential Special Status Plants

Common Name (Scientific Name)	Habitat	Survey Time
Wallowa ricegrass (*Achnatherum wallowaensis*)	Shallow rocky soils often with low sagebrush	Jun-Aug
Upward-lobed moonwort (*Botrychium ascendens*)	Mesic meadows, shrublands, and roadsides	June-July
Crenulate moonwort (*Botrychium crenulatum*)	Mesic meadows, shrublands, forests, and roadsides	June-July
Western moonwort (*Botrychium hesperium*)	Mesic meadows, shrublands, forests, and roadsides	June-July
Skinny moonwort (*Botrychium lineare*)	Mesic meadows and roadsides	Jun-Aug
Moonwort (*Botrychium lunaria*)	Mesic meadows, shrublands, forests, and roadsides	Jun-Aug
Twin-spike moonwort (*Botrychium paradoxum*)	Mesic meadows, shrublands, forests, and roadsides	Jun-Aug
Cordilleran sedge (*Carex cordillerana*)	Rocky slopes, usually in shade of trees and shrubs	Jun-Aug
Retrorse sedge (*Carex retrorsa*)	Floodplain forests, swamps, streamsides, wet thickets, and wet meadows	Jun-Aug

Common Name (Scientific Name)	Habitat	Survey Time
Rustic paintbrush (*Castilleja flava* var. *rustica*)	Sagebrush steppe	Jun-Aug
Salt heliotrope (*Heliotropium curassavicum)*	Saline or alkaline habitats at low elevations	May-Jul
Cusick's lupine (*Lupinus lepidus* var. *cusickii*)	Whitish tuffaceous deposits in sagebrush steppe	Jun-Jul
Membrane-leaved monkeyflower (*Mimulus hymenophyllus*)	Cliffs and talus slopes in forests or grasslands	Jul-Sept
Stalked-Leaved Monkeyflower (*Mimulus patulus*)	Riparian areas in forests or grasslands	Apr-Jul
Many-flowered Phlox (*Phlox multiflora*)	Open or wooded often rocky places, from the foothills to above timberline	May-Aug
Oregon semaphore grass (*Pleuropogon oregonus*)	Streambanks, wet meadows and marshes	Apr-May
Snake River goldenweed (*Pyrrocoma radiata*)	Sagebrush steppe often on calcareous soils	May-Aug
Malheur Prince's plume (*Stanleya confertiflora*)	Heavy clay areas within sagebrush steppe	May-Jun
Violet suksdorfia (*Suksdorfia violacea*)	Cliffs and talus slopes in coniferous forests	Jun-Jul
Douglas clover (*Trifolium douglasii*)	Moist to wet meadows and forested wetlands, and streambanks	Jun-Jul
Arrow-leaf thelypody (*Thelypodium eucosmum*)	Dry to moist areas in sagebrush steppe and juniper woodlands	May-Jul
Woven-spore lichen (*Texosporium santi-jacobi*)	Intact sagebrush steppe	Apr-Jun
Howell's spectacular thelypody (*Thelypodium howellii* ssp. *spectabilis*)	low elevation mesic alkaline meadows	Jun-Jul

Plant Survey Results 2010, and 2011

Approximately 3,953 acres in the project area were surveyed over 11 days in May – July 2010. The survey area was located in the northernmost unit on the south face of Rooster Comb. Survey intensity was Intuitive Controlled with a focus on rocky areas, riparian areas, whitish tuffaceous earth, and sagebrush steppe vegetation. Some areas of shrink-swell clays looked like potential habitat for Malheur Prince's plume (*Stanleya confertiflora*), although none was observed. Areas of tuffaceous earth appeared to be potential habitat for Cusick's lupine although none was found.

Two populations of stalked-leaved monkey flower (*Mimulus patulus*) were located consisting of 125 plants total. Both sites are less than .1 acre in size. Both sites are located along small intermittent streams, which were both running water in June 2010. These deep narrow drainages only allow for small narrow stringers of riparian vegetation to form. In addition, one population of cordilleran sedge (*Carex cordillerana*) was also found consisting of an estimated 312 plants covering approximately 2 acres. This population of cordilleran sedge is linear in shape and located about 50 feet upslope from the North Fork of Devil's Canyon Creek. This is a south facing slope and the cordilleran sedge plants are located at the ecotone where riparian vegetation ends and upland vegetation (Ponderosa pine grassland) begins.

Approximately 3,368 acres were surveyed over 29 days in May – September 2011. The survey area was located in the northern part of the central unit, located in the upper Clarks, Pine, and Cottonwood drainages. Small areas along French Gulch and Dixie Creek were also surveyed. Survey intensity was Intuitive Controlled. Twenty-six new locations for cordilleran sedge (*Carex cordillerana*) were found consisting of an estimated 4,261 plants on 98 acres. Most sites are associated with streams or aspen stands.

3.5.4 **FOREST AND WOODLAND VEGETATION**

Forest and woodland vegetation occur in five main areas within the Mormon Basin/Pedro Mountain project area and are described in table 3.2. These stands generally have a Douglas-fir dominated conifer overstory on the north facing slopes. Within these stands are also a scattered intermediate to mature dominant/co-dominant component of ponderosa pine and declining aspen clones. Average basal areas are 60-155 with all stands over the recommended stocking level for the sites they occur on (Powell 1999; Table 3.2).

The historic fire regime within this area would have been a frequent interval of low- to mixed-severity surface fire that would have thinned the understory and occasionally replaced the stand under intense burning conditions. Effective fire suppression has moved the forest ecosystem from one that was historically an early seral forest, adapted to disturbance, to a late seral forest that was not historically present on this site pre-European settlement. This late seral forest is characterized by a dominance of Douglas-fir with a multi-aged, and multi-layered stand structure. This unnaturally long and high stocking of shade tolerant Douglas-fir has compounded many of the forest health issues that are discussed below. Furthermore, the stress from several concurrent disease and pest agents has compounded the growth loss and called into question the viability of the stand.

3.5.4.1 Douglas-fir dwarf mistletoe

Douglas-fir dwarf mistletoe (*Arceuthobium douglasii*, DMT) is in all units of the project area and found at low to severe levels (Scott and Schmitt 2010; see Table 3.2). The majority of stands are considered moderately to severely infected. Dwarf mistletoe infected trees do not self-prune lower branches as frequently as uninfected trees; consequently, this creates a vertical fire ladder, which increases the risk/potential for fire to consume whole trees and stands (Parker, Clancy, and

Mathiasen 2006). Additionally, DMT infestations weaken trees defenses predisposing trees to mortality from other pests such as bark beetle attack (Parker, Clancy, and Mathiasen 2006). Silvicultural treatments that remove infected trees can be effective in controlling DMT (Schmitt 1997). Without action, forest health will continue to deteriorate.

3.5.4.2 Douglas-fir Tussock moth

Douglas-fir tussock moth (*Orgyia pseudotsugata*, DFT) is present at low levels within many of the proposed units. Defoliation by the DFT kills or top-kills many trees, weakens additional trees that are eventually killed by bark beetles, and retards tree growth for several years. There is some indication that fir growing in pine sites and fir stands growing on warm, dry sites (such as the majority of the proposed area) are most susceptible to DFT damage (Boyd et al 1981). Effective silvicultural management includes removing heavily infected trees, promoting pines on warm, dry sites and favoring larch on wetter sites (Overhulser 1999).

3.5.4.3 Pine butterfly

During the 2010 field season, it was noted that there was a high incidence of pine butterfly (*Neophasia menapia*) affecting conifers throughout the project area. The pine butterfly is mainly associated with large older ponderosa pine, but they can also defoliate Douglas-fir and larch. Populations of this insect are usually quite low, but large outbreaks are believed to have occurred periodically in the past in Oregon (ODF Forest Health Note 2010). Outbreaks are generally short-lived (e.g., 2-5 years), but can cause severe defoliation over large areas leading to growth loss and tree mortality (references). Bark beetle infestations, in trees weakened by defoliation, are common near the end of pine butterfly outbreaks. Silvicultural treatments that favor healthy trees, eliminating stressed and weak trees while promoting a species rich forest are recommended (ODF Forest Health Note 2010).

3.5.4.4 Western spruce budworm

Within the Douglas-fir stands there was potential western spruce budworm defoliation in the late 1980s and early 1990s (Scott & Schmitt, 2010) and is still present in some stands at low levels. Western Spruce Budworm is a defoliator of Douglas-fir and Grand fir. The susceptibility of mixed conifer forests may be minimized by increasing the complement of non-host species such as lodgepole pine or ponderosa pine, and reducing the percentage of Douglas-fir and true firs (Scott & Schmitt, 2010).

3.5.4.5 Bark Beetles

Bark beetles including the mountain pine beetle, *Ips*, and the fir engraver beetle have all been found within the proposed project area. These beetles are currently at low levels. If the overstocking and compounded stress from other disease and pest agents continues the resulting stress is very likely to attract mountain pine beetles, leading to Ponderosa pine mortality. In the Pedro mountain area the stands with grand fir over 20” DBH, fir engraver beetles (*Scolytus ventralis*) are active. In 2004, it was determined that mortality within grand fir would continue to increase due to the combination of drought and overstocking, which limits the trees ability to repel attack (Schmitt and Spiegel 2010).

3.5.4.6 Commandra Rust

Commandra rust is a fungus occurring within the Spirit hill, Pedro Mountain and Devils canyon proposed treatment areas. Commandra rust causes growth reduction, stem deformity, and mortality on lodgepole pine and ponderosa pine (Johnson 1986). Silvicultural recommendations include removing infected trees and maintaining a disease-free overstory.

3.5.4.7 Overstocking

Stands within the proposed units are overstocked, primarily with an understory of Douglas-fir that continues to regenerate due to their shade tolerance and lack of fire disturbance (Table 3.2). The historic fire regime within this area would generally have been a frequent interval of low- to mixed-severity surface fire that would have thinned the understory and occasionally replaced the stand under intense burning conditions. Effective fire suppression has led to excess Douglas-fir and juniper within a multi-aged and multi-layered stand structure. Overstocking has decreased the forest vigor and resistance to the forest health issues described above by increasing inter-tree competition for light, water and nutrients, limiting their ability to resist disease and pest agents.

3.5.4.8 Conifer encroachment

Intermediate to mature aspen and mahogany are components of all 5 of the proposed treatment areas. The current conifer (Douglas-fir and juniper) encroachment on aspen and mahogany signals a transition from fire-adapted, early seral to fire intolerant, late seral stages.

Aspen is considered an early seral adapted species dependent upon disturbance. It is shade intolerant, has a relatively short life span, responding quickly to above ground disturbances such as fire by releasing a multitude of sprouts from the roots. Aspen plays a vital role in wildlife habitat supplying forage for deer, elk and grouse. The increasing shade tolerant conifer component in aspen stands is shading out the aspen, slowly converting these ecologically important pockets into a conifer stand. The current aspen stands are in such dire need of restoration, it is predicted the aspen component will be lost in approximately 10-20 years (Schmitt and Spiegel 2012).

Throughout the proposed project area there are extensive stands of mountain mahogany found on exposed eastern facing and southern-facing aspects with shallow soils. Mountain mahogany is important to wildlife as it is one of the few vegetative species that meet protein requirements for wintering deer (Welch and McArthur 1979). Elk and grouse also extensively use this shrub for food and cover. Conifer encroachment (specifically juniper) is occurring within most of the mahogany stands. Without mechanical or natural disturbance, the conifers will continue to shade out the mahogany, eventually leading to extensive mahogany mortality.

Table 3.3 - Summary of Existing and Proposed Forest Stand Conditions

Forest Management Areas	Dominant Overstory Species	Initial Basal Area	Target Basal Area	Forested Treatment Acres	Health Issues
Dixie Creek	Douglas-fir	55-260 avg 155	20-160	400	DFT, WSB, DMT, CE
Pedro Mountain (Hot/dry)	Douglas-fir	60-240 avg 144	6-20 avg 15	190	DFT, DMT, CR, CE, BB
Pedro Mountain (Warm/dry)	Douglas-fir	60-240 avg 144	10-55 avg 36	380	DMT, CR, CE, BB
Spirit Hill	Douglas-fir	50-280 avg 145	30-35 avg 30	190	DMT, CR, CE
Clarkes Creek Drainage	Douglas-fir	120-180 avg 150	35-40 avg 36	135	DMT, CE
Pine and Cottonwood Creeks	Douglas-fir/Ponderosa Pine	40-180 avg 90	15-65 avg 40	410	DMT, CE, BB
Devils Canyon	Douglas-fir/Ponderosa Pine	30-90 avg 60	20-70 avg 47	180	DMT, CR, CE, BB

DFT = Douglas-fir Tussock Moth, WSB = Western Spruce Budworm, DMT = Dwarf Mistletoe, CR = Commandra Rust, Ips = Ips *ponderosae*, CE = Conifer encroachment on aspen, BB = Bark Beetle

3.6 CULTURAL RESOURCES

In the earliest days of Euro-American history in Malheur and Baker counties, gold served as the initial spark that ignited settlement. The earliest mining boom occurred in the Mormon Basin / Pedro Mountain project area after a gold strike by a group of miners from Salt Lake City occurred in 1862. Although gold mining in Mormon Basin never became highly developed due to limiting factors such as distance to a railhead and water shortages, it laid the groundwork for the introduction of livestock grazing, as well as much of the homesteading and road development that occurred in the vicinity of the project area.

By the mid 1860's, over 300 people had converged on the ore rich ridgelines that separate the Burnt River from Willow Creek in Malheur and Baker counties. A newspaper report from The Dalles observed that a mining camp with two stores had been set up to cater to the growing crowd of miners in Mormon Basin around the mid 1860's (Malheur County Historical Society 1988). Clarksville had been established about eight miles to the north of Mormon Basin after a gold strike near the mouth of Clarks Creek just prior to the Mormon Basin discoveries. The town eventually grew to around 200 people and a nearby Chinatown grew to a nearly equal population. The Clarks Creek Road connected the community of Clarksville with the mines of Mormon Basin and south to the camps of Amelia, El Dorado, and Malheur City. Cultural activity reached a peak near the northern boundary of Malheur County when the El Dorado Ditch, built using Chinese laborers, brought a dependable water supply 134 miles from the Burnt River to the Willow Creek mines southwest of Mormon Basin in 1874. Shortly after the completion of the El Dorado Ditch, the Malheur City Mining District produced over $150,000, one of its highest mineral outputs ever reported (Lindgren, 1930). The last of the substantial placer mining was probably performed by groups of Chinese miners noted by land surveyors as living in cabins at Mormon Basin in the late 1890's (Voight, 1895). After the placer gold mining boom of the late 19th century played out, the stage was set for a brief episode of industrialized hard rock mining in northern Malheur County that began in the project area shortly after 1900.

Livestock grazing became an important industry in the region as the needs of the growing mining camps in eastern Oregon and western Idaho increased. Cattle and sheep were driven into the Mormon Basin area from California and Nevada by 1863. Livestock numbers in the area increased every year after 1864 as the lure of open range and access to markets brought in even more stockmen. In the mid 1870's as mining outputs began to wane, cattle herds were driven or transported east in search of markets and the dominant form of livestock production transitioned from cattle to sheep. In 1883, the transcontinental railroad reached Ontario and improved access to markets, triggering a stock raising boom throughout eastern Oregon.

The archaeological record suggests that hunter-gatherer land-use practices in the Blue Mountains generally intensified as populations and competition for available resources increased in the region over time (Burtchard, 1998). Based on the typological cross-dating of projectile points observed in archaeological assemblages, it is estimated that cultural activities have occurred in the project area for at least the last 8,000 years (Wilde 1985). Hot-dry forests and woodlands of the American West were most likely intentionally burned on a regular basis by hunter-gatherers in the prehistoric and early historic periods (Agee 1994, Barrett 1980).

The project area was most likely utilized by several different named groups of hunter-gatherers prior to the time of Euro-American contact. It was used most regularly perhaps by groups of Northern Paiute and ancestors of the tribes (Umatilla, Walla Walla, Cayuse) currently affiliated with the Confederated Tribes of the Umatilla Indian Reservation (Steward and Wheeler-Voegelin, 1974). The Idaho Western Shoshone and Nez Perce were known to be present in the Snake River corridor at this time and they would have likely made forays into the adjacent uplands to gather roots in the spring and early summer as well as hunt big game in the fall.

The most frequently occurring prehistoric cultural resources in the project area are lithic dominated archaeological sites, known as "lithic scatters". Such deposits are the archaeological signature of pre-contact era occupations that can span several thousand years. Lithic scatters typically include obsidian, chert, and basalt artifacts and are often visible at the surface of the ground. There are two cultural resource properties documented in the Mormon Basin / Pedro Mountain project area that display a pre-contact period component. Sites of this type in the project area are less than a half-acre in size and display potential for patterned subsurface deposits.

Historic cultural resource properties documented in the project area appear to be closely related to late 19th century to mid-20th century gold mining. Resource types may include standing buildings; and/or archaeological features such as foundations or structural ruins, tailings features, abandoned mining equipment, privy pits, refuse dumps, and blazed trees. There are 13 cultural resource properties that have been identified within the project area that display a historic period component. One single-story building with galvanized steel siding is present on BLM administered lands in the project area. This standing building was constructed as a machine shop in 1957 and it lacks characteristics that would readily associate it with the development of mining in eastern Oregon. Therefore, it was evaluated as not eligible for the National Register of Historic Places. Post-contact era cultural resource properties in the project area range from .1 to one acre in size.

There are less than 4,000 acres within the Mormon Basin / Pedro Mountain project area that are considered “High Probability” for the occurrence of cultural resources. Approximately 300 acres within the project area were inventoried for cultural resources in 2008 in response to a gold mining plan of operations filed with BLM (Sharma et al. 2008). Several cultural resource properties documented in the vicinity of the project area contain or are adjacent to accumulations of hazardous fuels. Prior to project implementation, a Class II cultural resource inventory and consultation of the Confederated Tribes of the Umatilla Indian Reservation and the Burns Paiute Indian tribe would be required to comply with the terms of the Protocol for Managing Cultural Resources on Lands Administered by the Bureau of Land Management in Oregon. The Protocol describes how the BLM and the Oregon State Historic Preservation Office (SHPO) will cooperate under a national Programmatic Agreement to meet the requirements of Section 106 of the National Historic Preservation Act.

3.7 GRAZING MANAGEMENT

South Bridgeport (#11301), Bowman Flat (#01022), Dixie Creek (#01020), Brinker Creek (#01326), Devils Canyon (#01329), Log Creek (#05342), Towne Gulch (#15325), Mormon Basin (#01318) and Pedro Mountain (#01021) allotments are the principal grazing allotments within the project area. The generally authorized livestock (cattle) use in these allotments is summarized in Table 3.3 below.

Table 3.4 - Summary of Grazing Allotments

Allotment	ALLOTMENT Category	AUMs Active	LIVESTOCK Numbers	Usual Period of Use
SOUTH BRIDGEPORT #11301	I	928	350C	5/17-8/15
BOWMAN FLAT #01022	I	65	83C	6/1-6/30 OR 9/16-10/15
DIXIE CREEK #01020	I	343	200C	4/22-6/30 OR 9/28-10/31
PEDRO MOUNTAIN #01021	M	552	600C	7/1-9/30
BRINKER CREEK #01326	C	5	5C	NOT RESTRICTED
DEVILS CANYON #01329	C	60	60C	NOT RESTRICTED
LOG CREEK #05342	C	16	16C	NOT RESTRICTED
TOWNE GULCH #15325	C	32	32C	NOT RESTRICTED
MORMON BASIN #01318	M	857	280C	6/1-9/1

CUSTODIAL (C) CATEGORY ALLOTMENTS: These are grazing allotments that are unfenced small tracts, which are intermingled with much larger acreages on non-BLM rangelands, thus limiting BLM’s management opportunities.
IMPROVE (I) CATEGORY ALLOTMENTS: These are grazing allotments that have a potential for resource improvements where BLM controls enough land to implement changes.
MAINTAIN (M) CATEGORY ALLOTMENTS: These are grazing allotments where satisfactory management has already been achieved through resource management.

3.8 FIRE MANAGEMENT

The Mormon Basin landscapes are divided into mountain big sagebrush/perennial bunchgrass (41 percent), ponderosa pine forest/woodland (32 percent), Mixed Conifer Forest/woodland, and Wyoming Big Sagebrush/Bunchgrass (27 percent), biophysical strata for the purpose of evaluating the current Fire Regime Condition Class (FRCC) in the project area. The entire Mormon Basin project area was rated as FRCC 2, a condition that is moderately departed from historic reference values. The FRCC values for the project area are: mountain big sagebrush/perennial bunchgrass (FRCC 3), ponderosa pine forest/woodland (FRCC 3), Mixed Conifer Forest/woodland (FRCC 3), and Wyoming Big Sagebrush/Bunchgrass (FRCC 2),

Following coarse scale definitions developed by Hardy et al. (2001) and Schmidt et al. (2002), the natural (historic) fire regimes of these major vegetative communities have been classified based on average number of years between fires (fire frequency) as well fire severity (amount of replacement) on dominant overstory vegetation.

The five fire regime classifications commonly interpreted for fire and fuels management purposes include:

I – 0-35 year frequency and low (surface fires most common) to mixed severity (less than 75 percent of the dominant overstory vegetation replaced);

II – 0-35 year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced);

III – 35-100+ year frequency and mixed severity (less than 75 percent of the dominant overstory vegetation replaced);

IV – 35-100+ year frequency and high (stand replacement) severity (greater than 75 percent of the dominant overstory vegetation replaced);

V – 200+ year frequency and high (stand replacement) severity.

The FRCC is a classification of the amount of departure from the natural fire regime (Hann and Bunnell, 2001; Hardy et al., 2001). Coarse-Scale FRCC classes have been defined and mapped by Schmidt et al. (2002). They include three condition classes for each fire regime (Table 3.4). The classification is based on a relative measure describing the degree of departure from the historic natural fire regime. This departure results in changes to one (or more) of the following ecological components: vegetation characteristics (species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g., insect and disease mortality, grazing, and drought). There are no wildland vegetation and fuel conditions that do not fit within one of the three classes.

Table 3.5 - Summary of the FRCCs and associated potential risks as presented below.

FRCC	DESCRIPTION	POTENTIAL RISKS
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) regime.
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Risk of loss of key ecosystem components (e.g. native species, large trees, and soil) are low. Fire behavior, effects, and other associated disturbances are moderately departed (more or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate; risk of loss of key ecosystem components is moderate.
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components are high.

Mountain Big Sagebrush/Bunchgrass Stratum

Historic mountain big sagebrush/bunchgrass plant communities comprise approximately 41 percent of the project area. This stratum is composed of a shrubland occupying a mountainous landform. Within the mountain big sagebrush/bunchgrass stratum, historic fire frequencies were estimated to be 15 to 20 years (Miller and Rose, 1999), which is natural fire regime classification II (high frequency, high fire severity). In general, the surface fire behavior fuel model for this stratum is currently a model 6 (Anderson, 1982). Fuel model six is composed of scattered older juniper with shrubs and fire behavior is characterized by moderate–fast spread and high fireline intensity.

With the presence of encroaching young juniper (most under 12 feet) in amounts that are uncharacteristic of the plant community under a historic fire regime, the vegetation currently within the project area is moderately departed from historic conditions. Considering that fire has been excluded from more than 80 percent of this stratum for more than 100 years, the fuel composition, fire frequencies, and burn patterns within the project area also are considered moderately departed from reference conditions. Based on the large amounts of vegetation within the project area that are uncharacteristic of the historic range of variability and the high level of fire exclusion that has occurred in the project area, this stratum is rated as FRCC 2.

Wyoming Big Sagebrush / Perennial Bunchgrass Stratum

Wyoming big sagebrush/bunchgrass plant communities comprise approximately 27 percent of the project area. This stratum is composed of a shrubland occupying landforms of low hills and benches. Within the Wyoming big sagebrush/bunchgrass stratum, historic fire return intervals were estimated to be 35 to 100 years (Whisenant, 1990), which is natural fire regime classification III (high frequency, mixed fire severity). In general, the surface fire behavior fuel model for this stratum is currently a type 6 (Anderson, 1982). Fuel model six is composed of shrubs and fire behavior is characterized by moderate–fast spread and high fireline intensity. Exotic annual grasses are present in the understory of many stands of Wyoming big sagebrush in the project area in amounts that are not considered characteristic of reference conditions.

The current structure and composition of the Wyoming big sagebrush/bunchgrass stratum is similar to reference values. However, juniper encroachment and cheatgrass present in abundant quantities are not characteristic of reference conditions. Most cheatgrass invasion has taken place on lower elevations of the south slopes. Juniper encroachment is represented by trees of less than 12 feet in height, but there is also scattered old growth trees present on ridgetops and rocky outcrops. There is also a trace amount of ponderosa pine present in this stratum. A lack of early seral, grassy, fire-created openings also characterize the stratum. In light of these departures from reference conditions, this stratum is rated as FRCC 2.

Forest and Woodland Stratum

Ponderosa pine forest, mixed conifer forest, and woodland communities constitute approximately 32 percent of the project area. This stratum is composed of a ponderosa and mixed conifer dominated forest and/or woodland occupying a mountainous landform. Ponderosa pine forests and woodlands burned every 12-23 years historically (Maruka and Agee, 2005); which is natural fire regime classification I (high frequency, low to mixed fire severity). In general, the surface fire behavior fuel models that can be expected within this stratum are currently a model nine and a model ten (Anderson, 1982). Fuel model nine consists of a long needle conifer overstory with needle litter and some downed woody material at the ground surface. Fire behavior in this fuel type is characterized by fast moving fires and moderate to high fireline intensity. Fuel model ten consists of any forest type with greater than three inches of dead woody fuels and fire behavior is characterized by high fireline intensity with low levels of fuel moisture and moderate–fast rates of spread.

Forest overstory in this stratum primarily consists of a very dense, second-growth, stands of mixed conifer with heavy needle cast and duff throughout the stratum. In 1983 the Pedro Mountain Fire burnt 149 acres and then in 1990 the Thorton Fire burnt 1082 acres of which 393 acres (17 percent of this stratum) were on BLM land. Portions of the Thorton Fire can be classified as stand replacement fire and has come back naturally very dense and overgrown. Due to fire suppression and insufficient management of forest overstory trees through the rest of the project area, the rest of the stands have grown dangerously susceptible to a catastrophic crown fire. Due to remoteness of this area fires can quickly out-pace suppression capabilities and result in a stand-replacement event similar to the Thorton fire.

The upper layer of vegetation within the stratum has been largely unaffected by thinning treatments. Coniferous trees in excess of nine inches in diameter are abundant throughout the stratum so the canopy closure is an average of 60% in the ponderosa pine and around 70% in the mixed conifer stands. The understory of the ponderosa pine stands are now dominated by Douglas fir, white fir, western juniper and only scattered pine. The mixed conifer stands have a high amount of mistletoe present. Also due to the overstocking of small diameter trees the canopy base heights are dangerously low in these stands. These factors present across the landscape and a higher than average of fine fuels, this stratum is rated as FRCC 3.

3.9 VISUAL RESOURCES

The project area is located outside of any designated Visual Resource Management (VRM) Class I or II areas. Therefore, the area is considered Class III/IV according to the Baker RMP (1989). The objective of the assigned VRM Classes is as follows:

- **VRM Class III** - partially retain the existing character of the landscape. Management activities may attract attention but should not dominate the view of the casual observer.
- **VRM Class IV** - to provide for management activities that require major modifications of the existing character of the landscape. Management activities may dominate the view and be the major focus of view attention. However, every attempt should be made to minimize the impact of these activities through carefully locating activities, minimizing disturbance, and designing the projects to conform to the characteristic landscape.

The Proposed Action would occur primarily in the drainages, peaks and plateaus of Pedro Mountain, Mormon Basin, Clarks Creek, Dixie creek, Devils Canyon, and Cottonwood Creek which all have key visual factors of high topographic relief displayed in steep canyons, prominent cliffs and massive rock outcrops. The area has striking color variations included in large basaltic rock outcrops (gray/brown/black) with the higher elevations holding timber covered mountains, stringers of timber in draws and canyons, sagebrush covered plateaus and varying degrees of riparian vegetation. In the spring and fall of the year, visitors can also see high color variations in vegetation with velvety light green hills with wildflowers in the spring and striking contrast in colors of aspen stands, conifers and shrub species in the fall. Topographic, geologic and vegetative textures range from soft, smooth and contiguous in the sections associated with the higher sage brush plateaus and rolling semi-rugged hills of the lower to middle elevations, and harsh and diverse textures of the higher elevations and significant drainages and lava outcrops associated with the project area.

3.10 RECREATION

Within the project area, most recreational activities are dispersed in nature which occurs throughout the area. There are no established camping facilities or specifically managed recreational opportunities within the project area except for the Snake River-Mormon Basin Back Country Byway which passes along the southern and western edge of the project area. In 1991, the Snake River-Mormon Basin Back Country Byway was designated by Congress under the National Scenic Byways Program of the Federal Highway Administration. Clarks Creek Road and Mormon Basin Lane in the project area are segments of this Byway. This component of the National Back Country Byway system attracts local, regional and non-regional visitors who wish to experience the scenic views, history, and remote nature of this byway loop. For the remaining portions of the project area, recreational activities include sightseeing, driving for pleasure, picnicking, camping, hiking, use of off-road vehicles, hunting (big game and upland bird), horseback riding, OHV use, and some limited snowmobile use in the winter. BLM-administered lands in the project area are open to recreation uses, however some private land roads which would allow access to other segments of public lands are gated or physically blocked which restricts certain uses of public land. OHV use in this area is limited to roads and trails with no cross country travel being authorized. The remaining portions of the project area have no motorized use restrictions designated in the Baker RMP (BLM 1989) and are classified as “open”. Recreational opportunities and use of the public lands within the project area are considered to be seasonal and at moderate levels with uses being primarily in the form of hunting, sightseeing, and driving for pleasure.

3.11 SOCIOECONOMICS

The project area is situated on the northern boundary between Baker and Malheur counties in eastern Oregon. The major communities in the vicinity of the project area are rural in character and had levels of unemployment that exceeded the state of Oregon unemployment average of 6.5% and the national average of 5.8% in 2008 (Oregon Employment Department, 2010). Average unemployment rate for Malheur County was 7.3% in 2008, while the rate for Baker County stood at 7.0% for the year.

The local economies of both counties are both heavily dependent on livestock and feed production industries. Value of sales for livestock and poultry products in Malheur County was $72,941,000 in 2007 (Oregon Agriculture Information Network, Extension Economic Office available at http:/oain.oregonstate.edu). Livestock and poultry sales for Baker County in 2007 totaled $35,053,000.

In 2007, 1517 people in the two counties were employed in natural resource or mining industries (Oregon Employment Department at http:/qualityinfo.org). On an average annual basis, just timber removed from the Baker Resource Area provides 13 jobs and $422,000 in labor income (Oregon Employment Department at http:/qualityinfo.org). Hunting and other types of dispersed outdoor recreation are important to both counties for economic and social reasons. In 2008, over 26 million dollars in travel-generated expenditures were made in the two counties by recreationists involved in fishing, hunting, or wildlife viewing (ODFW 2009).

3.12 CLIMATE CHANGE

There is scientific consensus that increases in greenhouse gases in the atmosphere warm global temperatures. The Environmental Protection Agency (EPA) developed a "State of Knowledge" paper (2007) that outlines what is known and what is uncertain about global climate change.

1. Human activities are changing the composition of the Earth's atmosphere. Increasing levels of greenhouse gases like carbon dioxide (CO^2) in the atmosphere since pre-industrial times are well-documented and understood.
2. The atmospheric buildup of CO^2 and other greenhouse gases is largely the result of human activities.
3. An unequivocal warming trend of about 1.0 to 1.7 F occurred between 1906 and 2005. Warming occurred in both the northern and southern hemispheres and over the oceans (Intergovernmental Panel on Climate Change, 2007).
4. The major greenhouse gases emitted by human activities remain in the atmosphere for periods ranging from decades to centuries. It is therefore virtually certain that atmospheric concentrations of greenhouse gases will continue to rise over the next few decades.
5. Increasing greenhouse gas concentrations tends to warm the planet.

Fossil fuel combustion during human activities is a major source of CO^2 and other greenhouse gases to the atmosphere. Emissions from burning gasoline, coal, natural gas, and through other chemical reactions associated with cement manufacture that commonly occur in industrialized nations. Nationally, the United States releases approximately 1.6 billion metric tons CO^2 equivalent from burning fossil fuels and cement manufacturing each year (Boden et al. 2010). Global CO^2 equivalent emissions from fossil fuel burning and cement production were estimated at 8.4 billion metric tons (Boden et al. 2010).

Another way in which atmospheric greenhouse gases can be increased is through reduction of organic carbon sequestration in vegetation and soils. Forests, woodlands, and even rangeland are viewed as potential sinks for carbon that might otherwise contribute to climate change. Carbon dioxide from the atmosphere is captured by trees, plants, and agricultural crops and stored as carbon in biomass (tree boles, branches, shrubs, grasses and forbs, roots) and soils. As vegetation grows, carbon is sequestered and these additional tons of carbon can be used to offset emissions from other sources. Events or actions that can release CO^2 to the atmosphere include deforestation or conversion of forest or rangeland to agricultural lands or developed landscapes (IPCC 2000).

It is uncertain, however, how much warming will occur, how fast warming will occur, and how the warming will affect the rest of the climate system, including the precipitation patterns (EPA, 2007). Because of this uncertainty about changes in precipitation, it is not possible to predict changes in vegetation types and condition, wildfire frequency and intensity, streamflow, and wildlife habitat.

4 ENVIRONMENTAL EFFECTS

The Environmental Effects section discusses in detail the environmental effects that would occur under the Proposed Action, the Low Impact Alternative, and the No Action Alternative. The effects of the No Action Alternative form a baseline against which all other alternatives are evaluated. Potential impacts are described in terms of type, context, duration, and intensity.

Type describes the classification of the impact as beneficial or adverse, direct or indirect:

Beneficial: A positive change in the condition or appearance of the resource, or a change that moves the resource toward a desired condition.

Adverse: A change that moves the resource away from a desired condition or detracts from its appearance or condition.

Direct: An effect that is caused by an action and occurs in the same time and place.

Indirect: An effect that is caused by an action but is later in time or spatially removed in distance, but is still reasonably foreseeable.

Context describes the area or location in which the impact would occur. Are the effects site-specific, local, regional, or even broader?

Duration describes the length of time an effect would last as short-term, mid-term or long-term.

Unless otherwise stated, short-term impacts would generally last for five years or less, a mid-term effect would last for 5-20 years, and a long-term effect would persist for beyond 20 years.

Intensity describes the magnitude, level, or strength of an impact. For this analysis, intensity has been categorized into negligible, minor, moderate, and major.

Negligible: The resource would not be affected, or effects would not be measurable. Any effects to the resource would be slight and short-term and would occur in a relatively small area.

Minor: Effects to the resource would be detectable, but would affect a small area. If an effect is adverse, design features or mitigation would be needed to offset adverse effects, they would be relatively simple to implement and would likely be successful.

Moderate: Effects to the resource would be readily apparent and would occur over a relatively large area. If an effect is adverse, design features or mitigation would probably be necessary to offset adverse effects and would likely be successful.

Major: Effects to the resource would be readily apparent and would substantially change the resource over a large area. If an effect is adverse, extensive design features or mitigation would probably be necessary to offset adverse effects, and its success could not be guaranteed.

4.1 AIR QUALITY

This analysis of environmental effects is based on the assumption that light intensity prescribed burning in the spring and fall would create lower total smoke emissions than high intensity stand-replacement wildfires of summer and early fall. The Proposed Action and Alternative 3 reintroduce fire into the ecosystem on a landscape scale during the spring and fall months. As more large areas are treated, air quality in the region would increase during the summer months due to the occurrence of fewer wildfires.

Direct and Indirect Effects from Alternative One – No Action

Under the No Action Alternative, no fuel treatments would occur and there would be no direct effects to air quality in the region. The potential for large, intense wildfires to occur would be greater within the project area with no implementation of fuels management treatments. The negative impact to air quality would probably be greater from a wildfire occurring in the area as wildfires typically have a longer ignition phase, or burn longer, consume more of the burnable biomass and produce more gases and particulate matter than prescribed fires. The area in question would continue to amass woody debris in the absence of treatment.

Direct and Indirect Effects from Both Action Alternatives

The effects of the Proposed Action and its action alternative would be described as local, short-term, and minor. Project implementation would produce smoke from prescribed burning and to a lesser degree dust from mechanical treatments. Impacts to air quality from prescribed fire and pile burning could range from reduced visibility, to pneumonic irritation, and smoke odor affecting people in proximity to the Project Area when such treatments are underway. These impacts are short-lived and the greatest impact would occur during the ignition or active burning phases of the project. Burning portions of the project may last between one to three days depending on the size or number of actual burn units or number of piles to be ignited. Residual smoke produced from the burnout of large fuels, or slower burning fuel concentrations could occur, lasting for one to three days following the ignition phase. Impacts to air quality from mechanical treatments would be airborne dust generated while operating that would reduce visibility in the immediate project area, ceasing quickly when such operations stop.

The areas of greatest impact from prescribed fire would be those areas downwind and down drainage from the project area. This includes the communities of Rye Valley, Bridgeport, Durkee, and Brogan; as well as undeveloped campsites, Interstate 84 and various county roads. These areas could experience settling of smoke due to their proximity to prescribed fire treatments and being down drainage from the project area.

The intensity of the impacts would be dependent on atmospheric conditions at the time of ignition. Prescribed fires are planned and implemented when atmospheric stability and wind conditions promote smoke dispersion into the atmosphere and/or transport out of the area. In addition they are planned when diurnal wind conditions limit the amount of smoke pooling in canyons and valleys. Baker City is a Smoke Sensitive Receptor Area is 25 miles to the north may possibly be impacted if a south wind is present during implementation. Based on its location from project center with respect to the common wind vectors for the project area the likelihood of substantial impact is low. The Eagle Cap Wilderness, located forty miles to the north of the project area, is designated as a Class I airshed. It is highly unlikely to be impacted by smoke due to dominant wind vectors in the region that come from the north to west and the distance is too great. Any burn plan produced for the project would contain a contact list of residents adjacent and near the project area that would be informed of anticipated short-term smoke impacts.

The areas of greatest impact from mechanical treatments would be the immediate Project Area and unimproved, (i.e., dirt) roads, used in association with the project.

Alternative 3, the Low Impact Alternative, would treat approximately 5-7% fewer acres of mixed conifer forest with treatments that reduce canopy closure. This would slightly increase the likelihood of high intensity wildfires occurring in the project area during the summer that would have

Other prescribed fire and mechanical fuel reduction projects are planned for the Baker and Malheur Resource Areas and adjacent Wallowa-Whitman National Forest. While the cumulative effect may impact air quality, the impact would be short-lived, focusing on the time of project implementation to a few days post treatment.

4.2 WATER QUALITY / WETLANDS RIPARIAN

Direct and Indirect Effects from Alternative One – No Action

There would be no direct or indirect effects to water resources associated with the No Action Alternative because there would be no vegetation management, prescribed burning, pile burning, construction of temporary roads, road improvements, riparian hardwood enhancement, or weed control beyond current management. All current management activities and other uses would continue in the project area, including livestock grazing, recreation, ongoing road maintenance, mining, and wildfire suppression. Because no project-related changes would occur if no actions were taken, the condition of water resources described in the previous section would continue along its current trajectory.

Under the No Action Alternative stream temperature and sediment in the project area would be expected to either stay the same or increase. Conifers currently supply most of the streamside shade along the small streams in the project area while riparian woody and herbaceous species provide lesser amounts. Without conifer removal, the shade from conifers would continue to insulate stream water from solar radiation and stream temperature patterns would remain the same. Factors contributing to an increase in water temperature would include high intensity wildfire and sediment supplied by continued channel incision. Left in its current condition, the upland and riparian conifer density would leave watersheds susceptible to high intensity high severity wildfires. The loss of overstory in the riparian area (conifers, riparian shrubs, and graminoids) as a result of a wildfire represents a risk of long-term reduction in shade contribution and a long-term increase in stream temperatures for project streams and downstream reaches. Further, high intensity and high severity wildfire would increase sediment inputs into the streams due to erosion of upland soils leading to elevated stream water temperatures.

Rates of stream bank and stream bed erosion associated with channel incision would continue at current levels or increase due to conifer encroachment and loss of riparian woody species under the No Action Alternative. Conifer encroachment into the riparian area would continue and increasingly inhibit riparian woody and herbaceous species success. Riparian species not only provide shade but have root densities that stabilize banks, promote channel sinuosity, and maintain bank erosion rates appropriate for landscape position. The continued loss of riparian species represents a risk of continued or increased sediment inputs into streams due to headcuts, channel incision, and channel bank and bed erosion.

Direct and Indirect Effects from Both Action Alternatives

Areas within Silvicultural Thinning Units

The combined activities within silvicultural thinning units (underburning, jackpot and pile burning, non-commercial thinning, commercial thinning) would not alter water and riparian resources because the treatment areas are physically separated by standard or site specific buffers that adequately trap sediment, promote infiltration, and are free of channelized flow. Stream temperature would not increase due to the amount of retained vegetation providing shade and streambank stability. Due to the result of proposed treatments, erosion, channel incision, or widening would not increase due to the maintenance of bank stability from remaining conifer roots. Over time, channel stability would increase as deciduous riparian vegetation becomes established.

There is no potential for these units to contribute sediment into a stream channel because there are sufficient distances and ground cover between the channels and proposed treatment activities to effectively trap any sediment that might leave the site via overland flow. No increase in runoff would be expected because the low-moderate intensity fire would not remove large overstory or create hydrophobic soils. At present, the major source of sediment in some of the streams is erosion of the stream banks and channel bed. Increases in base flows due to removal of vegetation are expected to be negligible and short-lived (e.g., less than 10 years).

Areas within the riparian buffers would not be affected by mechanical disturbances since activities occurring within the buffers would be limited to cutting small diameter conifers (<9”), construction of hand-piles, hand-pile burning, and forest underburns. Large diameter (>9”) trees may be lifted out of the designated buffer areas by mechanized equipment positioned outside the buffer. Large diameter conifers may also be cut and left in place to promote stream channel structure. Over time, water quality should improve with removal of conifers encroaching on riparian systems.

Areas within Sagebrush Steppe and Buffers

Cutting encroaching conifers from sagebrush steppe in the project area would not negatively alter stream temperatures, sediment inputs, discharge patterns, or channel bank and bed stability from current conditions. There would be no activities within standard and site specific buffers. While the hydrologic response of juniper removal is variable and not well understood, there are anecdotal evidence that show increased discharge in streams and springs following juniper removal (Miller et al. 2005). Increased and later base flows could lead to lower stream temperatures, narrower stream channels, wider riparian areas, and improved bank stability due to riparian vegetation expansion.

Broadcast burning and jackpot and pile burning in sagebrush steppe communities would have no adverse effects on water and riparian resources because the burn pattern resulting from treatment would be a mosaic of burned and unburned patches. The proposed treatments would not blacken more than 30% of the landscape. No increase in runoff would be expected because the low-moderate intensity burn. Prescribed burning minimizes or negates short term impacts allowing adequate spring growth of vegetation cover to stabilize bare ground before storms events occur the following season. A moderate positive impact is expected as the vegetative community is regenerated through mimicking fire’s natural processes.

Broadcast burning and jackpot and pile burning within buffers would have no short-term adverse effects on water and riparian resources for the reasons outlined above. In addition, large diameter conifers will be cut and left in place to improve stream channel structure.

Herbicide

Alternative 2 includes herbicide application for annual grass control. All the pertinent Standard Operating Procedures and Mitigating Measures from the Vegetation Treatments Using Herbicides on BLM Lands in Oregon ROD 2010) would be implemented. Thus, there would be negligible and non-measurable impacts to water and riparian resources due to the use of herbicide application. Further, the reduction of annual grasses will favor the expansion of native vegetation in the uplands and riparian areas. Native plant expansion will improve watershed functions (e.g. infiltration, aquifer recharge, late season discharge), bank and channel stability, sinuosity, and stream temperature.

4.3 Soils

Direct and Indirect Effects from Alternative One – No Action

Under the No Action Alternative, no thinning or use of prescribed fire would occur. No fuels treatments and no new road construction would transpire leaving soil productivity to continue along its current trajectory. The project area would continue to be characterized by high fuel loads with potential for stand replacement fires which in turn could have direct, major adverse impact soil productivity in the project area. Stand replacing wildfires can destroy all of the vegetation in an area and cause surface erosion, loss of soil nutrients, decreased soil productivity, increased sedimentation, and loss of shade, increases in stream temperatures, and a decrease in soil infiltration. No roads will be built under this alternative, and current road maintenance would continue. No changes in soil erosion, compaction, or displacement from timber harvest and hauling would occur.

Direct and Indirect Effects from Alternative Two – Proposed Action

Mechanical treatments of forested stands can result in direct, indirect, and cumulative effects upon the soils resource. These effects may include changes to soil erosion, soil compaction, or soil displacement. The project design features (See Chapter 2, The Proposed Action and Alternatives) and the standard design features in the Baker RMP (USDI 1989) would prevent undue impacts to the soils resource.

Soil compaction resulting from the use of ground-based equipment can occur during harvest and yarding activities. These activities would occur within the defined silvicultural thinning units, outside standard and site specific buffers, and would be limited to slopes less than 35% (2100 acres). Use of existing skid trails wherever possible would minimize soil compaction, soil displacement, and loss of productivity. Before mitigation, estimated areas of soil compaction including roads (existing and new), skid trails (existing and new) and landings (existing and new) total 350 acres (8%) for Alternative 2 and 320 acres (7%) for Alternative 3. After mitigation these estimates drop to 5% and 4%, respectively, which represent a negligible effect. These amounts fall below the threshold of 12% of the project area set in the Baker RMP. Further, in Alternative 2, the temporary roads constructed would be obliterated and decommissioned within a single season, causing a negligible effect on the soils. Seeding of bare soil areas with native grasses after skidding would also help vegetation establish quicker and help reduce soil erosion related to project activities.

The soils in the project area have water erosion hazard ratings ranging from moderate to very high (NRCS 1997). This is based on the steep terrain, loamy textures, and moisture regime. The existing roads in the project area are in good shape and are not rutted, and the existing skid trails are well vegetated. A variety of ground based and cable logging systems would be implemented within commercial thinning units. Erosion from logging operations increases on steeper slopes, so ground based activities are limited to slopes less than 35%. Activities on slopes steeper than 35% include skylining and helicopter logging to minimize erosion. BMPs such as limiting number of skid trails, waterbarring skid trails, seeding bare soil areas, etc. are critical in minimizing possible erosion and sediment impacts. Following BMPs and Project Design Elements would reduce the risk of soil surface erosion associated with the proposed activities.

Soil displacement hazard ratings for soils in the project area range from moderate to severe (NRCS 1997). This is based on productive soil thickness, rock content, slope, and texture. Ground based activities would minimize soil displacement by occurring on slopes less than 35%, using low pressure equipment, and working in dry or frozen conditions.

Underburning and pile burning would be utilized in the silvicultural thinning units. Burning can also cause impacts to the soil resource. Large slash piles, which cause extreme heat can reduce soil productivity, remove soil nutrients, and provide a bed for noxious weeds to become established. Impacts would be reduced by burning of the piles in late fall or winter after snow is on the ground. After burning, these areas would be seeded with native grasses as soon as possible in late winter or early spring to reduce the chance of noxious weeds becoming established.

Burning of hand piles should have minimal impact to the soils resource. These piles would be small and scattered throughout the units and would not produce the same intensity or duration of heat as the large landing piles. Impacts would be reduced by burning of the piles in late fall or winter after snow is on the ground. After burning, these areas will be seeded with native grasses as soon as possible in late winter or early spring to reduce the chance of noxious weeds becoming established.

There would be no mechanical thinning activities outside the silvicultural thinning areas. Impacts to the soil resource due to hand thinning and prescribed burning, as described in the project activities section, would negligible. As mentioned above, the soils productivity within the project area can be damaged by moderate intensity fires (NRCS 1997). Broadcast burning (<1,000 acres) would take place when fine fuels could be consumed without burning significant amounts of larger material or allowing for high fire intensities that would damage the soil. This timing would be during the fall when the soil moisture contents are high and large fuel moistures are low.

Impacts to soil resources in these units due to pile burning would be the same as those described for silvicultural thinning units.

Hand piling and burning as well as underburning activities are proposed within standard and site specific buffers, therefore, it could produce several small bare soil areas, which is unlikely to deliver sediment from surface erosion to the stream. These piles would be at least 25 feet from the stream and seeded with native species as possible to reduce erosion and invasion of noxious weeds. If carried out as described in the project activities and project design features, there would be negligible impacts to the soil resource within standard and site specific buffers.

Herbicide use would have potential short term effects by temporarily increasing bareground due to removal of invasive species vegetative cover. However, the long term cumulative effects of herbicide applications would be moderate and beneficial to soil resources due to an increase in native species plant cover. Implementation of the pertinent Standard Operating Procedures and

Mitigating Measures from the Vegetation Treatments Using Herbicides on BLM Lands in Oregon ROD (Oct 2010) would make any short term effects to the soil resource negligible.

4.4 FISH AND WILDLIFE

4.4.1 **FISHERIES**

Direct and Indirect Effects from Alternative One – No Action

There are no direct or indirect effects to fish and fish habitat under the No Action Alternative because no change in the overall baseline condition of the watershed would occur, nor the baseline condition of its streams. However, fuels accumulation within the defined project area would continue to increase, which would increase the potential risk of wildfire. Indirectly, this could result in the loss of healthy riparian vegetation and function, including stream shade and cover, which is vital to both fish and fish habitat. See the Hydrology section for further discussion of the No Action alternative on temperature, sediment, stream flow, and channel and bank stability.

Direct and Indirect Effects from Both Action Alternatives

The thinning and prescribed fire treatments proposed under both action alternatives aim to restore fire-dependent ecological communities to a state that is resilient to wildfire, insects, disease, and other disturbances. Reduction of ladder fuels contributing to a high risk of crown fire and reduce hazardous fuels, which benefit the fisheries resource. Specific benefits include the retention of fire and disease-resistant tree species and increased vigor and growth of desirable tree, understory, and riparian species. Silvicultural thinning, manual cutting, and prescribed fire would maintain a more open stand structure in the uplands and reduce conifer competition in riparian areas within the defined project area, thereby decreasing the risk of catastrophic wildfires, especially within sensitive riparian areas.

Thinning and fire treatments in this project would not negatively affect aquatic habitat for fish or fish populations in the area. Although a non-measureable amount of sediment would reach fishbearing streams, no instream structures would be removed, and there would be no effect to streambank and channel stability. Reduction of conifers within standard and site specific buffers would be done according to the project design features and would allow rapidly growing riparian woody species to increase. Riparian species provide higher bank stability functions and would promote increased sinuosity, groundwater storage, and later season flows. The potential to increase instream riffles and pools beyond its current state greatly improves with the replacement of conifer species with riparian species in the riparian areas should have a positive moderate effect.

Because none of the new temporary roads cross fish bearing streams, impacts to aquatic habitat from new road construction would be indirect. Indirect impacts of the action alternatives to fisheries include sediment disturbance. Temporary roads will be constructed, used, and decommissioned within the same season. At the end of each year, there will be no increase in road density within the project area. Standard and site specific buffers would provide adequate sediment trapping function to limit sediment inputs from road-related activities to negligible and non-measurable amounts. Peak flows would not be altered because road densities would not increase. Further, temporary road construction would follow the project design features, which protect aquatic habitat. Thus, the impacts to aquatic habitat due to new temporary road construction would be negligible.

The Proposed Action includes broadcast application of herbicides for annual grass control. All the pertinent Standard Operating Procedures and Mitigating Measures from the Vegetation Treatments Using Herbicides on BLM Lands in Oregon ROD (Oct 2010) would be implemented. Thus, there would be no impacts to the fisheries resource anticipated due to herbicide application. Further, the reduction of annual grasses will favor the expansion of native vegetation in the uplands and riparian areas. Native plant expansion will improve watershed functions (e.g. infiltration, aquifer recharge, and late season discharge), bank and channel stability, sinuosity, and stream temperature.

4.4.2 TERRESTRIAL AND AVIAN WILDLIFE

4.4.2.1 Greater Sage-Grouse

Direct and Indirect Effects from Alternative One – No Action

All supporting sage-grouse habitat (5,818 acres) under Alternative 1, would continue to degrade from encroachment. Western juniper is found throughout the whole project area and has changed the composition and habitat quality that supports sage-grouse. Changes in habitat, depending on juniper phase, can have numerous negative impacts on sage-grouse (Connelly et al. 2000). These negative impacts include facilitating perch sites for predators, diminishing the understory vegetation necessary for nest concealment, and reducing the overall open structure needed during lekking season (Connelly et al. 2000; Miller and Eddleman 2000). Under this alternative, western juniper would continue to encroach on both PPH and PGH habitat which is not beneficial for sage-grouse. Overall, this alternative would have long-term moderate to major negative impacts to sage-grouse habitat within this region.

Direct and Indirect Effects from Alternative 2 – Proposed Action

Alternative 2 is in compliance with the Draft Interim Management Guidelines for managing sage-grouse habitat within sagebrush ecosystems. The removal of juniper would benefit sage-grouse and their suitable habitat by eradicating the overhead structure used by predators and by eliminating the component that changes the understory vegetation in the ecosystem. It is estimated that about half of the project area is currently considered to be unsuitable for sage-grouse due to juniper encroachment. Under this alternative, prescribed fire and cutting juniper would remove the encroaching juniper from these plant communities. Treatment areas would be treated with a broadcast application of herbicide to control annual grasses. Wyoming and Basin big sagebrush would not be intentionally burned in prescribed burn activities. Treatments are expected to have extremely short-term negative impacts on suitable habitat from noise and disturbance during implementation that are minor in magnitude. Yet, alternative 2 would be expected to improve sage-grouse habitat and will have a beneficial long-term impact that is moderate in magnitude.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Under Alternative 3 will not be as effective at reducing and controlling noxious weeds because it would only authorize spot treatment (less than 100 acres) for noxious weeds and annual grasses. Within sage-grouse habitat it would be important to have proper noxious weed treatment. Overall, Alternative 3 would be less beneficial for sage-grouse habitat in area that are be encroached by western juniper. This alternative would have long-term beneficial impacts that would be minor in magnitude.

4.4.2.2 Eagles (bald and golden)

Direct and Indirect Effects from Alternative One – No Action

No vegetative treatments would take place under Alternative 1; thus, creating and range and forest lands dominated by juniper and overstocked conifers with a limited understory of annual grasses. Over time conversion of range and forests into a low resilient ecosystem would increase the risk of high-intensity fires and disease and insect susceptibility within eagle habitat. This alternative would not be beneficial for eagles as they rely on open rangelands for their hunting grounds and large timber for their roost and nesting sites. Because this Alternative 1 would reduce habitat used for hunting this would have long-term negative impacts that are minor to moderate in magnitude.

Direct and Indirect Effects from Alternative 2 – Proposed Action

Alternative 2 would apply treatments for juniper eradication that would be beneficial within their hunting and foraging habitat. Conifer removal and restoration of sagebrush ecosystems offer habitat for prey species, benefiting eagles. There would be short-term impacts that would be minor in magnitude if treatments would take place during foraging, nesting, and roosting areas. However, long-term impacts of juniper treatment would be beneficial and minor to moderate in magnitude. Any known eagle sites would be avoided during the course of treatment to reduce any negative impacts.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative Under this alternative the focus will still be reducing fuels, but reducing impacts to soils, maintaining current densities, and restricting the use of chemicals. Having a ‘light-handed’ approach within this alternative would not impact eagles as much as other wildlife species. This Alternative would still have long-term moderate beneficial impacts for eagle habitat.

4.4.2.3 Bats

Direct and Indirect Effects from Alternative One – No Action

Under Alternative 1, there would be no treatment that would help reduce areas that are being converted into unfavorable habitat. Conversion to conifer dominated lands would lead to a greater risk of high intensity fires and susceptibility of disease and insect infestations. This would not be beneficial for bats because high intensity fires would destroy nesting, roost, and foraging habitats. Alternative 1 would have greater negative impacts for the fringe myotis because they rely on forests. Pallid and Townsend's bat rely on rock crevasses for roosting. However, high intensity fires would have long-term negative impact on foraging areas for these species. Therefore, negative impacts would be minor to moderate in magnitude.

Direct and Indirect Effects from Alternative 2 – Proposed Action

Alternative 2 would reduce the amount of juniper that is currently encroaching within the roosting and foraging bat habitat. This would also reduce the potential of high intensity fires, maintaining beneficial bat habitat. The treatment objective of restoring historic vegetation conditions and reducing stand replacing fire in both range and forested areas would have long-term beneficial impacts that are moderate in magnitude for bats in the project area.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Alternative 3 would reduce silvicultural treatments by 5 to 7 percent which would be negligible to bat habitat. Overall, Alternative 3 would have long-term beneficial impacts to bat habitat that ranging from minor to moderate in magnitude.

4.4.2.4 Deer and elk

Direct and Indirect Effects from Alternative One – No Action

Under Alternative 1, big game habitat would continue to degrade. Browse species, (bitterbrush, big sagebrush, choke cherry, etc.) that deer and elk rely upon would continue to decrease in quantity, health, vigor, and palatability. Mountain mahogany and aspen stands would also continue to be out competed by juniper and overstocked conifers. This would likely lead to the eventual loss of these habitats. Overall, this alternative has long-term negative impacts that are moderate in magnitude.

Beck and Peek (2005), suggest that forage selection between elk and deer overlap during late summer and a variety of forbs, grasses, and browse species like aspen and mahogany are pursued. Their study concluded that forbs are a 'fundamental component' to elk and deer in aspen-sagebrush ranges (Beck and Peek 2005). Under Alternative 1, forb availability would be reduced as juniper encroachment continues in areas that are utilized by big game. (Rowland et al., 2005), found that juniper can considerably impact habitat suitability for wildlife by decreasing understory diversity and composition. Overtime these changes can lead to loss of shrubs and a greater susceptibility to weed infestation, decreasing forage availability. If the ranges on which they rely on are in poor quality deer and elk can't build the fat reserves needed to survive (even if the winter is mild). It is important to have the most available forage for wildlife and an ecosystem that is being suppressed by juniper encroachment and overstocked conifer stands are not beneficial.

Direct and Indirect Effects from Alternative 2 – Proposed Action

Management actions under Alternative 2 are expected to increase vegetative species and habitat diversity, increasing species richness and improving wildlife habitat. Implementing Alternative 2 would interrupt western juniper and other conifer encroachment, improve forest health, and cause an increase in herbaceous grasses (especially bunchgrasses), forbs and shrubby browse species. In addition, mountain mahogany, bitterbrush, and aspen stands would be maintained and enhanced as a result of this action. The mosaic created by the prescribed burning and mechanical treatments would increase the diversity of habitats within the planning area. These treatments would remove much of the encroaching juniper and other conifers in sagebrush, mountain mahogany, and aspen communities causing an increase in the health, vigor, and palatability of winter forage for both deer and elk.

The increase in grasses and forbs, from removing encroaching juniper and reducing overstocked conifer stands, would be a benefit to all big game species, especially elk. These treatments would have long-term beneficial impacts to big game that are moderate in magnitude.

Temporary roads that increase the treatment area on 5-7% of the project area would have a minor short term negative impact deer and elk through noise and disturbance. This would be offset by an increase in forage and a diversity of habitats due to thinning of overstocked stands, reduction of juniper, and decommissioning of temporary roads within a single year.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

This alternative would not allow the construction of temporary roads and only existing log skid roads/landings would be used. Also, broadcast applications of herbicide would not occur under this alternative.

The elimination of temporary roads would reduce the risk of noxious weed spread on 5-7% of the treatment area. Conversely, the elimination of broadcast herbicide use would increase the risk spread of noxious annual grasses. Otherwise, the effects would be similar to those displayed in the proposed action.

4.4.2.5 Northern Goshawk

Direct and Indirect Effects from Alternative One – No Action

No treatments would take place under Alternative 1; therefore, juniper and non-desired conifers would encroach on suitable goshawk habitat. Reynolds et al. (1992), considered the goshawk as an indicator of forest health because they require large mature healthy trees for their life history needs and an understory that would support their foraging needs. Juniper encroachment and overstocked conifers increases the fire intensity and reduces the diversity within their habitat. Stands that experience a high intensity fire take years to recover to pre-event conditions. Fire suppression may lead to increased susceptibility of stand replacing fire and insect and disease outbreaks, which can result in the deterioration or loss of nesting habitat (Graham et al. 1999, cited in NatureServe 2011, Wisdom et al. 2000). Loss of foraging habitat is due to dense conifer understory as a result of fire suppression. Aside from the fire, stands would also be more susceptible to disease and insect mortality, decreasing overall habitat. For reasons discussed, Alternative 1 would have long-term negative impacts that are moderate in magnitude.

Direct and Indirect Effects from Both Action Alternatives

Alternative 2 would be beneficial for goshawk habitat because it would reduce the ladder fuels that create high intensity fires. Silvicultural treatments would also be beneficial for goshawks because it would remove unhealthy trees, reducing insect and disease spread. Although within the treatment areas the canopy cover would be reduced to 30 percent there is sufficient dense canopy habitat in the vicinity to support their needs. Treatments would include sufficient downed logs and snag retention within areas that to support goshawks habitat and foraging needs. This alternative would have long-term beneficial impacts ranging from minor to moderate in magnitude.

4.4.2.6 Neotropical Migratory Birds

Direct and Indirect Effects from Alternative One – No Action

Under Alternative 1, no disturbance to migratory birds would occur due to human activity. Rangeland plant communities would continue the transition to juniper woodlands while the stocking of ponderosa pine forests increased. When western juniper density and cover increase to the point that shrub and herbaceous understory are suppressed, avian species diversity decreases (Reinkensmeyer et al. 2007). Avian species diversity is also likely to decrease as conifer stands continue to increase in basal area. Mountain mahogany and aspen stands would also continue to be encroached upon and outcompeted by juniper and pine trees, which would lead to the eventual loss of these habitats. A loss of these habitats would also lead to a loss in avian species diversity. This alternative would favor the few species that prefer juniper woodlands and densely overstocked conifer stands. Overall, Alternative 1 would have long-term negative impacts that are moderate in magnitude.

Direct and Indirect Effects from Alternative 2 – Proposed Action

The effects on migratory birds would depend on the treatment and vegetation that is being treated. The overall net effect of the Proposed Action would likely be an increase in habitat diversity and an increase in avian species diversity.

<u>*Sagebrush and Shrub-Steppe Communities*</u>

Where western juniper has developed into woodlands on mountain big sagebrush/bunchgrass and Wyoming sagebrush sites, migratory bird diversity and richness is relatively low. The use of prescribed fire and/or mechanical cutting in these areas would regenerate grasses and forbs. Shrubs including sagebrush and bitterbrush would also regenerate as a result of the proposed action. As these species regenerate bird diversity and richness is likely to increase. Birds nesting in cavities in old growth western juniper would be minimally affected as these large juniper trees are generally fire resistant, and would not be targeted by mechanical treatments.

In areas where juniper is in phase I of transition to woodlands, migratory bird diversity and richness is relatively high. Where western juniper density and cover has increased to the point that shrub and herbaceous understories are suppressed, avian species diversity decreases

(Reinkensmeyer et al. 2007). Treating annual grasses in the project area with herbicides is expected to have no direct effect on migratory birds.

In the short term, Alternative 2 would increase bird species diversity overall. Species diversity would decrease in broadcast burn areas as habitat complexity decreases and plant communities are move back to early seral stages. Overall, implementation of either action alternative would increase migratory bird species diversity over the long-term as structural diversity of the habitat increases with plant succession that would be moderately beneficial for neotropical and migratory birds.

Forested Areas

Implementation of either action alternative would open up the stands allowing grasses, forbs, and shrubs to regenerate. The opening of the stands would also increase the health and vigor of retained trees, thus, promoting larger trees in the long-term that would be moderately beneficial in magnitude. Existing snag and downed woody debris habitat would be retained to the extent practical. A few of the existing snags and large downed woody debris are likely to be lost during the prescribed fires, but new snags and large downed woody debris are likely to be created by the prescribed fire. All of the above would increase vegetative species and habitat diversity, which would likely increase avian diversity and richness.

In the-long term, cavity nesters and other birds that utilize snags and larger trees would moderately benefit from the action alternatives as they would protect existing large trees and snags while promoting large tree recruitment in the future. Other avian species that favor open stands would have a minor benefit impact. There would be a reduction in habitat quality for birds that prefer dense conifer understories or a high degree of canopy closure.

Mountain Mahogany, Aspen Stands, and Riparian Plant Communities

Migratory bird species, which utilize mountain mahogany, quaking aspen, and riparian communities, would have moderate benefits under the action alternatives as they would protect and enhance these vegetative communities. Migratory bird diversity and richness is generally very high in aspen stands and riparian plant communities. Removal of juniper and other conifers from these communities would increase the health and vigor of the stands, thus stimulating regeneration and recruitment of younger trees. Fencing of aspen stands would provide protection of the young and regenerating trees from browsing animals further promoting the regeneration of the stand. Protection and enhancement of these communities would ensure long-term availability of these habitats for migratory birds in the future. The net effect of treating mountain mahogany stands and riparian communities would be increase in avian species diversity in the future.

The proposed action would cause both immediate and long-term benefits for Brewer's sparrows, sage sparrows, and loggerhead shrikes. Treatments that involve felling of juniper or killing juniper with fire would immediately improve habitat quality for these species. Broadcast burn treatments may initially degrade the habitat for these species as both sagebrush and juniper would be consumed by the fire, but it should improve habitat quality for these species in the future when sagebrush reestablishes itself. Depending on the area, Alternative 2 would have long-term beneficial impacts that ranging from negligible to moderate in magnitude.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Under this alternative the focus will still be reducing fuels, but reducing impacts to soils, maintaining current densities, and restricting the use of chemicals. Having a 'light-handed' approach within this alternative would not impact neotropical and migratory bird species as much as other wildlife species. Alternative 3 would reduce silvicultural treatments by 5 to 7 percent and only treat less than 100 acres of noxious weeds which would be negligible to the amount of habitat available for these species. Overall, Alternative would have long-term beneficial impacts that are negligible to minor in magnitude.

4.5 VEGETATION

4.5.1 **NON-FOREST VEGETATION**

4.5.1.1 Mountain Big Sagebrush/Perennial Bunchgrass

Direct and Indirect Effects from Alternative One – No Action

Plant communities would continue on a predicted successional transition to fully-developed juniper woodlands. Most plant communities are in early and mid-transitional stages of juniper woodland development. As plant communities proceed toward juniper woodlands, community structure and composition would change altering community processes such as hydrology, nutrient cycling, and energy flow. As woodlands move from mid- to late stages of development, thresholds are approached or crossed. These thresholds include 1) significant decline in shrubs, 2) a decline in fire potential, 3) reduced tree mortality to fire due to increasing tree size, 4) decline in berry production, and 5) a potential decline in herbaceous cover and diversity dependent on soils and other site factors (Rose & Eddleman 1994, Eddleman et al. 1994).

Direct and Indirect Effects from Alternative Two – Proposed Action

The response of vegetation following western juniper removal by cutting with chainsaws and burning has shown increased understory production and diversity and improved perennial cover and density. Removal of juniper by cutting and burning would create or maintain open sagebrush plant communities with composition of diverse associations of grasses and forbs. Juniper would be reduced to levels typical of more historic conditions. Reducing juniper stocking would result in increased herbaceous and shrub species composition and structural diversity. Cutting and burning of juniper would release herbaceous components of plant communities and many shrubs would be retained, and subsequently released from competition with juniper following treatment. The areas (approximately 1,500 acres) that are broadcast burned and utilized for temporary roads and trails for implementation activities would have a short term loss of shrub cover. In the long term sagebrush is expected to reestablish on these areas and may eventually exceed pretreatment levels due to the reduced competition from juniper. These same areas would have some potential for expansion of cheatgrass and other invasive species in those areas that do not currently have healthy understories of native perennial grasses and forbs. This potential would be mitigated through the use of herbicides and/or reseeding. Where adequate deep-rooted perennial grasses, native forbs and shrubs are present on site before treatment, they would respond with increased density and/or productivity. But on sites with sparse native plant density, annual grasses and forbs would occupy the sites.

Intense heat resulting in some plant mortality would occur on localized areas where piles are burned. This effect would primarily be limited to areas directly beneath juniper trunks and large branches. Permitted removal of cut juniper and required conditions of burning would reduce the potential for soil sterilization due to the reduction of juniper slash to be burned. There is adequate seed source of native perennial plant species to allow rapid colonization of localized areas that may be sterilized. The Proposed Action also includes seeding of perennial grasses, forbs, and shrubs if needed within the treated areas to accelerate plant community recovery. Potential benefits of nutrients released during burning would be reduced as some material is removed. However, extensive amounts of juniper would still remain on site for later burning.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Impacts would be similar to Alternative Two with the exception that fewer acres would be disturbed by implementation activities, lessening the risk of conversion of those areas to undesirable vegetation.

4.5.1.2 Low Elevation Sagebrush

Direct and Indirect Effects from Alternative One – No Action

It is likely that a stand replacing fire would occur due to the abundance of cheatgrass in these communities, particularly on south aspects. Without a significant fire event plant communities would continue on a predicted successional transition to fully-developed juniper woodlands. Most plant communities are in early and mid-transitional stages of juniper woodland development. Under either scenario community structure and composition would change altering community processes such as hydrology, nutrient cycling, and energy flow and would eventually lead to a loss of the sagebrush community and structure.

Direct and Indirect Effects from Alternative Two – Proposed Action

Removal of western juniper on encroached systems can result in a rapid increase in herbaceous production and cover (Bates et al. 1998, Bates et al. 2000). Reduction in juniper would create or maintain open sagebrush plant communities. Herbicide treatment and reseeding would increase the amount of desirable understory species and lessen the potential for a stand replacing wildfire. Intense heat resulting in some plant mortality would occur on some localized areas where piles are burned. This effect would primarily be limited to areas directly beneath juniper trunks and large branches. Permitted removal of cut juniper would reduce the potential for soil sterilization due to the reduction of juniper slash to be burned.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Impacts would be similar to Alternative two with the exception that fewer acres would be disturbed by implementation activities, lessoning the risk of conversion of those areas to undesirable vegetation. Without the use of herbicides the risk of stand replacing wildfire would remain as there would be no reduction in cheatgrass, in fact cheatgrass would likely expand slightly with the removal of juniper and the associated ground disturbance increasing the risk of a stand replacing wildfire and the loss of the sagebrush community.

4.5.1.3 Riparian Hardwood / Aspen Vegetation

Direct and Indirect Effects from Alternative One – No Action

Riparian and aspen communities would continue to decline as a result of continued encroachment of conifers. Conifers compete with aspen and riparian vegetation for available moisture. Although juniper does not transpire year-round in the colder climate of eastern Oregon as it does in warmer winter areas (Jeppesen 1978), it does get a big jump in water use during early spring because it maintains all of its leaf area present (Miller and Schultz 1987). Advantageous use of soil moisture by juniper reduces understory vegetation, plant reestablishment, and vigor (Jeppesen1978). Juniper surface roots may extend outward considerable distance from the main stem depriving other vegetation of available soil moisture. When conifers overtake aspen communities, less water is available to the watershed, biomass of understory vegetation is significantly reduced, and the diversity of wildlife and plant species declines. The greatest concern is the loss of aspencommunities, an important wildlife habitat, once a conifer community becomes established because aspen does not readily establish from seed (McDonough 1985, Mitton and Grant 1996).

Direct and Indirect Effects from Alternative Two – Proposed Action

The conifer cutting and prescribed fire treatments would result in significant reductions in conifer cover and density within the stands. Reduction of invading conifers would allow regeneration of riparian and aspen communities. Aspen, riparian shrubs and herbaceous cover and species richness would be enhanced.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Impacts would similar to those described under Alternative Two.

4.5.1.4 Western Juniper

Direct and Indirect Effects from Alternative One – No Action

No action would result in a predicted successional transition to fully-developed juniper woodlands. Western juniper would continue to expand across the landscape.

Direct and Indirect Effects from Alternative Two – Proposed Action

Western juniper would be reduced across the landscape to levels more closely resembling historic conditions. Old growth juniper would remain and continue to be a part of the landscape.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Impacts would be similar to those described under Alternative Two.

4.5.2 NOXIOUS WEEDS

Direct and Indirect Effects from Alternative One – No Action

Existing noxious weeds would be treated in accordance with the Vale District Integrated Weed Control Plan and EA OR-030-89-19 as extended 2009, unless a new EA, currently being prepared, is finalized by the time this project is implemented. Since the disturbance causing activities of thinning, conifer cutting, and burning would not occur, the effect to weed management would be negligible over the long-term across the project area. However, invasive annual grasses would not be treated and would continue to expand in sagebrush communities. These plant communities would become less diverse and less resilient to disturbance and would likely become dominated by invasive annual grasses which would have a moderate long-term adverse effect across the project area.

Direct and Indirect Effects from Alternative Two – Proposed Action

Activities associated with building temporary roads and improving existing roads would create disturbed areas which would provide favorable sites for the invasion and establishment of weeds. In addition to creating disturbed areas, equipment associated with road work could introduce new weeds to the area and spread existing weeds. Adverse impacts would be minor to moderate in the short-term across the project area, but over the long-term would be negligible as temporary roads would be obliterated or decommissioned after every year, continued weeds monitoring and washing equipment would help prevent the introduction of weeds.

Forest treatments involving commercial harvest, mechanical thinning and cutting, mechanical crushing, mechanical piling and whole tree yarding would create disturbance and provide opportunities for new weeds to be introduced to the project area by equipment and vehicles as well as increase the potential for spreading existing weeds within the project area. Project Design Elements pertaining to the washing of vehicles and treating weeds identified following implementation would reduce the potential for weed introduction. Due to the level of disturbance created by these activities, long-term adverse impacts would be negligible to minor across the project area.

Manual conifer cutting could also introduce new weeds and spread existing weeds but not to the extent that commercial thinning activities would since logging equipment and large trucks would not be used. There would be fewer entries to the individual project sites resulting in less traffic, reducing the potential to introduce new weeds and spread existing weeds. In addition, ground disturbance would be minimal thus long-term adverse impacts would be negligible across the project area.

Fuels treatment activities involving piling and burning, jackpot and broadcast burning and constructing fire lines have the potential to introduce new weeds and spread existing weeds. These activities would increase disturbance in the short term, and provide a favorable environment for weeds to establish. Fuels treatment actions would have site-specific impacts that would be adverse, short-term, and moderate. However, the overall long-term effects on weed control across the project area would be beneficial and moderate as ecological condition is improved.

Broadcast herbicide application to annual grasses would benefit the sagebrush/bunchgrass community by eliminating competition for resources that the desirable plants need to grow. Imazapic is a selective herbicide which targets invasive annual grasses and would not damage desirable plants applied at the specified rate by licensed and experienced applicators. Across the project area the long-term impacts to weed management would be moderate to major and beneficial as desirable plants improve their vigor and are better able to compete with weeds.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Under this alternative broadcast herbicide application to annual invasive grasses would not occur. Herbicide treatments would be limited to spot applications on discrete stands of noxious weeds.

By limiting the use of pre-emergent herbicides to control annual invasive grasses, the health and vigor of the sagebrush/bunchgrass communities would continue to decline and the fine fuel fire hazard would remain. Long-term impacts would be adverse and moderate to major across the project area.

The construction of new roads would not occur. This would reduce the potential for weed introduction and spread but since thinning activities would only be reduced by 5-7%, the long-term beneficial effects to weed management of not constructing new roads would be negligible across the project area.

4.5.3 SPECIAL STATUS PLANTS

Direct and Indirect Effects from Alternative One – No Action

No direct effects to special status plants would occur under the No Action Alternative. Possible indirect effects of the No Action Alternative could include loss of habitat due to juniper encroachment for special status plant species that are dependent on open sagebrush steppe habitats. Special status plants that may occur in the project area that are dependent on open habitats in sagebrush steppe are Snake River goldenweed, rustic paintbrush, Wallowa ricegrass, woven-spore lichen, and Malheur prince’s plume. Possible indirect impacts to these five taxa would be long-term.

Direct and Indirect Effects from Alternative Two – Proposed Action

<u>*Direct Effects*</u>

The majority (approximately 88%) of the cordilleran sedge (*Carex cordillerana*) located in the project area are in areas of mechanical thinning. There is a small bit of cordilleran sedge located in the north end of the Clark's Creek unit in an area slated for juniper removal and burning. The Proposed Action of mechanical thinning would consist of thinning the overstory coniferous trees, hauling off merchantable material, burning slash, and vegetation, spraying herbicides to control weeds, and seeding.

The Proposed Action of cutting and removing overstory trees that occur above special status plant sites has the potential to cause injury or mortality to special status plants. The spraying of herbicides on special status plants also has the potential to injure or cause mortality to these plants. The potential direct effects of the proposed project on special status plants would be minor and long-term. These potential impacts are not expected to occur due to the project design features that provide for buffers and no direct treatment of special status plant sites.

The direct effects of fire on special status plants are generally not known. It seems possible that fire could easily kill some special status plants with shallow root systems. Still, special status plants in the project area should have some tolerance of fire, having evolved in a fire dependent system.

<u>*Indirect Effects*</u>

The indirect effects of removing the overstory conifers above special status plants sites would change the microclimate at these sites. More sunlight would reach the special status plants, relative humidity would be reduced, soil moisture could also be reduced due to increased evapotranspiration, and wind speeds would be increased. The environmental requirements for most special status plants are not known. Some special status plants do not occur in open areas without trees; instead, they only occur in areas with overstory trees and filtered sunlight. It is highly probable that the proposed action of overstory tree removal and the resultant changes in microclimate would make these sites less habitable to special status plants. Four special status plants and one lichen species are an exception to this. Malheur Prince's plume, Snake River goldenweed, Wallowa ricegrass, rustic paintbrush, and woven-spore lichen all occur in open sagebrush steppe habitats. It is probable that juniper removal would help to maintain open sagebrush steppe habitats that are preferred by these five taxa.

The indirect effects of the proposed skidding of trees for harvest have the potential to increase the abundance and distribution of nonnative weedy plants in the project area by increasing the areas of soil disturbance in the project area. The indirect effects of prescribed burning of fuel jackpots also have the potential to create new unoccupied open habitats for weedy nonnative plants. The burning of jackpots of cut juniper or conifer slash also creates areas of increased nitrogen availability that nonnative annual grasses can better utilize than native perennial bunchgrasses. Both skidding of timber or biomass material and burning of jackpots could increase the abundance and distribution of weedy plants, which could outcompete special status plants for resources and thus reduce their vigor.

The potential indirect effects of the project on special status plants should be ameliorated by the project design features to place no treatment buffers around special status plant locations and treatment of invasive species.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Direct, indirect, and cumulative effects to special status plants would be much the same as those described under Alternative 2. There are two very small locations of cordilleran sedge consisting of 16 plants total, located along the South Fork of Dixie Creek that are excluded from treatment under Alternative 3. Thus, direct, indirect, and cumulative impacts to special status plants would be reduced by less than one percent under Alternative 3 compared to Alternative 2.

4.5.4 FOREST AND WOODLAND VEGETATION

Direct and Indirect Effects from Alternative One – No Action

The No Action Alternative would allow the project area to continue on its current trend towards a historically unnatural late seral stage forest (e.g., increasing juniper, changes in species composition, changes in forest structure, decreasing mahogany, decreasing aspen/riparian hardwood and increasing insect/disease activity). With no thinning or prescribed fire implemented within the project area, trees would continue to die at an accelerated rate due to the compounding effect of increased inter-tree competition and insect and disease infestations all due to overstocking. This increased mortality would result in an increase in cured, readily combustible ground and ladder fuel densities. Green ladder fuels would also continue to increase as understory trees grow larger and new understory trees begin to grow. The potential for these stands to succumb to stand replacing wildfire would continue to increase. Additionally, aspen/riparian and mountain mahogany stands would continue to degrade due to conifer encroachment.

Direct and Indirect Effects from Alternative Two – Proposed Action

A direct impact of implementing the Proposed Action, to forested stands throughout the project area, would be the reduction of tree density in overstocked stands (Table 3.2). Indirect effects associated with decreased tree density are increased resistance to stand replacing fires and insect/disease outbreaks. Specifically, controlling the density of conifers on stressed sites by pre-commercial and commercial thinning which decreases stocking to efficient basal areas will maintain tree vigor and reduce risk from bark beetle outbreaks (Mason and Wickman 1994; Edmonds, Agee, and Gara 2000).

An additional direct effect of thinning throughout the project area would be a shift in species composition to an earlier seral state (Table 3.2). Throughout the west, there has been a dramatic shift from forest types once dominated by early seral stands of ponderosa pine to late seral stands of fir and the overstocking of millions of acres with more trees than the sites can support (Wickman & Quigley 1992; Edmonds, Agee, and Gara 2000). The goal is to create a clumpy/gappy forest structure to promote/maintain early seral (e.g., ponderosa pine) throughout the project area while maintaining tree diversity (Table 3.2). This will indirectly reduce the risk of insect outbreaks in Douglas-fir, western larch and Engelmann spruce (e.g., bark beetles, Douglas-fir tussock moth and the western spruce budworm) throughout the project area by decreasing tree competition and removing diseased trees (Parker, Clancy, and Mathiasen 2006).

Reduction of dwarf mistletoe (DMT) throughout the project area would be a direct effect of implementing the Proposed Action Alternative. Management of DMT seeks to reduce severity while maintaining DMT for biodiversity (Table 3.2). Specifically, Douglas-fir, western larch, and ponderosa pine dwarf mistletoe infested trees would be targeted for removal; reducing the disease incidence (will not be eradicated). Indirect effects of removing mistletoe infested trees include increased resistance to stand replacing fires and insect outbreaks. Dwarf mistletoe infected trees do not self-prune lower branches as frequently as uninfected trees; consequently, this creates a vertical fire ladder, which increases the risk/potential for fire to consume whole trees and stands (Parker, Clancy, and Mathiasen 2006). Additionally, residual trees should be twice as likely to ward of bark beetle attacks because dwarf mistletoe infestations weaken trees defenses predisposing trees to mortality from bark beetle attack (Parker, Clancy, and Mathiasen 2006).

Additionally, implementation of the Proposed Action Alternative would directly remove up to 85% of conifer encroachment (both commercial and non-commercial trees) into aspen and mahogany stands/clumps throughout the area. A 100% removal of encroaching conifer will not be achieved because most of the larger (e.g., greater than 23in dbh) ponderosa pine, Douglas-fir and larch, located in stands, will be retained. The effect of reducing conifer densities would include the stabilization of aspen/riparian hardwood/mahogany populations and potentially increase aspen/riparian hardwood/mahogany populations (e.g., acreage and density) throughout the area. This will directly improve wildlife habitat.

Other direct effects include site disturbance such as, soil compaction, vegetation removal, and noise disturbance. However, these effects are generally short term (e.g., less than 10 years) and there are features designed in the proposed action limiting impacts following implementation (See Project Design Elements). With regard to the effects of road creation and use of skid trails on soils look at the soil section of the EA (Section 4.3).

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Effects would be similar to the Proposed Action; however, beneficial effects would be reduced in the Pedro Mountain and Dixie Creek Timber Management Areas. Specifically, 9.0% of the timber stands would not be commercially harvested.

Within Dixie Creek the area being removed from commercial harvest, proposed in alternative 2, is the most at risk to defoliators due to the multi-layered canopy structure and overstocking of Douglas-fir (Schmitt & Scott 1993). Since the area is predominately overstocked with commercial size timber (approximately 80%) the risk would remain high in these stands if no commercial harvest is allowed. However, the overall risk of insect/disease and hazardous fuel loading throughout the entire Mormon Basin planning area would be reduced.

The effect of not using imazapic on forested stand treatments as under alternative two would produce short term negative impacts by introducing newer invasive species and spreading existing weeds into the treatment areas. Forestry treatments would have short term site specific adverse impacts; however the tradeoff would be positive long duration effects across the management area. Ecological conditions would improve overtime as the invasive species control becomes more stable and manageable.

4.6 CULTURAL RESOURCES

Direct and Indirect Effects from Alternative One – No Action

Under the No Action Alternative, there would be no direct effect on cultural resources identified in the Mormon Basin / Pedro Mountain project area as no fuels reduction, watershed enhancement, or habitat improvement activities would be implemented. However, with no implementation of fuels reduction activities, archaeological and architectural resources would continue to be in jeopardy of damage or destruction by large-scale wildfire.

Direct and Indirect Effects from Alternative Two – Proposed Action

Under the Proposed Action, cultural resources would not likely sustain any direct or indirect adverse effect. Project design elements are in place to protect identified archaeological resources from the direct effects of mechanical disturbance and fire-related damage. Secondary effects of mechanical disturbance, such as erosion of site deposits, would likewise be avoided through the observation of project design elements. Application of pre-emergent herbicide would have no adverse effect on archaeological or built cultural resources and would have a long-term minor beneficial effect for fire-sensitive historic archaeological or built resources located within or near the project boundaries as sagebrush – bunchgrass communities become more fire resistant with the reduction of exotic annual grass cover.

Implementation of prescribed burning activities could pose some risk to built or other fire-sensitive cultural resources that are identified in the project area. The connected action of constructing approximately three miles of temporary road would also represent a minor risk of disturbance to a buried or unidentified archaeological resource.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Cultural resources would not likely sustain any direct or indirect adverse effect under Alternative Three. Project design elements would be in place to protect identified archaeological resources from the direct effects of mechanical disturbance and fire-related damage. Indirect effects of mechanical disturbance, such as erosion of site deposits, would likewise be avoided through the observation of project design elements. With lesser amounts of ground disturbance proposed under Alternative Three, there would be reduced risk of disturbing an archaeological resource that was not adequately avoided by project design.

However, in general, fuels reduction and ecosystem restoration at a landscape level should have a stabilizing influence on archaeological resources in the project area. Therefore, archaeological properties would be less likely to be disturbed by high intensity wildland fire and fire suppression activities with greater amounts of acres treated under the Proposed Action.

4.7 *Grazing Management*

Direct and Indirect Effects from Alternative One – No Action

As plant communities transition toward fully developed juniper woodlands in these grazing allotments, forage production and diversity would be reduced or lost entirely lost. The shrub component of these plant communities would begin to experience high rates of mortality before major effects occur to the herbaceous species. The effects to grasses and forbs would be site-specific and may occur later in the transition to juniper woodlands.

A long-term effect would be reduced forage availability (Bates et al., 1999 and 2000). The effect of reduced forage production would cause changes to current livestock management practices and possible adjustments to livestock stocking levels. Any changes in management would be determined through rangeland monitoring. Wild or prescribed fire occurrence would require that affected pastures are rested from livestock grazing for at least two growing seasons following the burn (after wild or prescribed fire, grazing could not occur sooner than seed-ripe stage of the second growing season).

Direct and Indirect Effects from Alternative Two – Proposed Action

Under the Proposed Action, a minimum of two years of growing season rest would be necessary following prescribed burn (not pile burning) treatments in the Pedro Mountain, Dixie Creek, and Bowman Flat grazing allotments. Modifications to existing grazing permit schedules may be made available to permittees when a pasture or the public portion of a custodial allotment is receiving mandatory rest following a prescribed fire treatment.

1. **Pedro Mountain Allotment and Dixie Creek Allotment**
   Three pastures under Grazing Permit #3606020, Thornton Gulch and Pedro in the Pedro Mountain Allotment, and Upper Deer Creek in the Dixie Creek Allotment, would require rest or deferment until after seed-ripe for at least two consecutive growing seasons. Treatments would be staggered so that each of these three pastures would be burned in a different year, so at least one pasture would still be available for grazing during the growing season in any given year, assuming objectives are achieved and additional rest is not necessary.

2. **Bowman Flat Allotment**
   For two consecutive years after burning, this allotment would receive either rest or a fall (9/16 to 10/15) grazing treatment.

In the long-term, the quantity and quality of forage would improve within pastures treated with prescribed fire and/or broadly applied herbicides for annual grass control. Forage production following treatment would increase because more soil moisture would be available to herbaceous plants following removal of juniper and shrubs by fire. Livestock would find the increased herbaceous community more favorable for grazing which would improve livestock distribution within treated portions of pastures.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

Under the Low Impact Alternative, at least two growing seasons of rest for affected portions of pastures may be necessary following prescribed burn treatments. Modifications to existing grazing permit schedules may be made available to permittees when a pasture is receiving mandatory rest.

Improvement of forage conditions under the Low Impact Alternative would only be considered minor in the long-term due to the lack of broad-scale annual grass treatment in the lower elevations of the project area.

4.8 FIRE MANAGEMENT

Direct and Indirect Effects from Alternative One – No Action

Fire would not be reintroduced under the No Action Alternative. Rangeland plant communities would continue on a predicted successional transition to fully-developed juniper or ponderosa pine woodlands (Rose & Eddleman 1994). Pine dominated forest stands would continue to present a severe crown fire hazard and threaten private property and resource values. Firefighters would be placed at greater risk as during future suppression efforts in environments with elevated fuel loads.

Direct and Indirect Effects from Alternative Two – Proposed Action

Implementation of the Proposed Action would lower the risk of a large-scale, high severity wildfire event occurring in the project area. The overall FRCC rating of the planning area would change from a Class 2 to a Class 1 as open early seral shrublands increase across the landscape and closed canopy pine forest and mixed conifer stands are treated.

The treatments would reduce the FRCC from a rating of Class 3 to Class 1 or 2 in the mountain big sagebrush/bunchgrass stratum. The fire behavior fuel model would be reduced by reducing the young Juniper and opening up the more natural opening in the Mountain Sage.

The FRCC rating of the ponderosa pine dominated forest and woodland stratum would decrease from Class 3 to Class 2 or 1 as fuel loading would decrease and fuel patterns are less continuous. The fire behavior fuel model would change from a model 9-10 (timber and loosely compacted litter) to a model that resembles fuel model 8 (timber with compact litter). Fire behavior in these areas can be expected to have low rates of spread, low fire intensities, and low flame lengths immediately following fuel treatment.

The pile burning, jackpot burning, and broadcast application of herbicide conducted in the Wyoming big sagebrush/bunchgrass stratum would change the FRCC rating from a Class 2 to a Class 1 under the Proposed Action. This would be done by reducing the encroaching juniper and following up with pre-emergent herbicide applications (imazapic) to areas infested with exotic annual grass. The fire behavior fuel model would change from a model 6 (shrubs with juniper and light grass) to a model 5 (shrub-grass fuels). Fire behavior in the Wyoming big sagebrush stratum post-treatment would be low intensity as shrub litter, native perennial grasses, and forbs would become the primary carriers of fire.

Direct and Indirect Effects from Alternative Three – Low Impact Alternative

The effects of the low impact alternative would be largely the same as those described under the proposed action effects analysis. An exception to this is the effects within the low elevation sagebrush, or Wyoming sagebrush ecological communities where cheatgrass cover can be as high as 20%. Removing the use of the pre-emergent herbicide in the Low Impact Alternative would continue the dominance of cheatgrass in the plant community and the threat of large fires with uncharacteristic fire effects would remain in this stratum. The fire behavior fuel model would remain a model 6 (shrubs with juniper and light grass) rather than shifting to a model 5 (shrub-grass fuels) as described in the effects under the proposed action. Fire behavior in the Wyoming big sagebrush stratum post-treatment would remain characterized as high-intensity with rapid rates of spread. The pile burning, jackpot burning without broadcast application of a pre-emergent herbicide for annual grass control would still change the FRCC rating from a Class 2 to a Class 1 under the low impact alternative.

4.9 VISUAL RESOURCES

Direct and Indirect Effects from Alternative One – No Action

Under the No Action alternative, impacts to Visual Resources would be negligible to major. Although there would be no impacts resulting from prescribed activities and the viewshed would remain as it has in the past, the chances of a catastrophic fire event would not be abated. Large and intense fire events can not only alter the normal or accustomed landscapes, but they can be of such intensity in areas of high fuel loading that they completely change the vegetative diversity which often decreases the quality of landscapes scenery. Impacts under this alternative would be adverse, minor to major (if fire occurs) in magnitude and long term at local levels depending on fire intensity.

Direct and Indirect Effects from Both Action Alternatives

Under the Proposed Alternative, fire, fuels and vegetation management would alter the visual resources and would have adverse impacts to the scenic aesthetics of the landscapes within the project area. However, most of these impacts are short-term and would not dominate the viewsheds of the project area in general. Treatments within forested settings as well as the more open and arid landscapes can result in both short and long term adverse impacts depending on the severity of the fire activities as well as the vegetation manipulations that can leave stumps clearly visible which can last a considerable amount of time. Additionally, the development of fire lines, and spur roads can also have long lasting impacts to visual resource values depending on the placement and subsequent intensity of rehabilitation of spur roads. However, with the proposed management, rehabilitation mitigations as well as a combination of types of treatments, the short term and some long term impacts from implementation quickly change visually as vegetation re-establishes itself and softens the impacts of the prescribed activities. Landscapes would be visually altered by fire scars and stumps from tree removal over time without constituting long term detrimental impacts on the VRM values as the vegetation component would quickly incorporate or obscure the remaining impacts. Adverse minor to moderate short term impacts, with some long-term components such as burnt snags, stumps and debris would occur from the management of Fire and Fuels at the local level. Beneficial impacts would range from negligible to minor depending on the size, location and vegetation component of management activities and would be primarily long term.

4.10 RECREATION

Direct and Indirect Effects from Alternative One – No Action

Under this alternative, recreation activities would occur as they have in the past and the impacts from fire events would range from being isolated and short term in nature, to more catastrophic, long term and landscape altering under more intense fire events. The adverse impacts from fire events, although landscape changing in some cases, is more readily accepted by recreationist as a component of the natural environment and does not significantly impact recreational pursuits for the long term as vegetation and associated recreation re-establish themselves. Hunting, camping, wildlife viewing, driving for pleasure as well as other recreational pursuits quickly rebound in areas of fire events, regardless of whether those events are natural or prescribed. Overall, the impacts to recreation from the management of fire and fuels under this alternative would be adverse, short term and minor to moderate at local levels.

Direct and Indirect Effects from Both Action Alternatives

Under both action alternatives, short-term adverse impacts from road, primitive road or trail closures as well as the immediate effects of the vegetation and fuel treatments. Implementation of this alternative would displace recreational users and could affect recreation opportunities and experiences by changing the landscapes scenic attractiveness and the availability for use of areas identified for treatment. However, providing prompt rehabilitation from fire management activities and vegetative treatments would minimize any long-term adverse impacts to recreation by reducing the displacement time of recreational pursuits associated with the project area. Beneficial impacts would be seen from the implementation of the proposed management actions as the recreation quality and quantity is improved through condition and health of area vegetation which often attracts recreationists. Other beneficial impacts occur from hazardous fuel level treatments which reduce the chance of uncontrolled/high intensity fires that can change landscapes and alter recreational opportunities. Appropriate fire and fuels management can have both a direct and indirect benefit on recreation as higher quality/quantities of recreation opportunities develop. Although recreation uses quickly adapt to areas of fire events, changes or increases in these uses also result as the landscape improves due to fire and fuels management. Additionally, improved access for recreational pursuits from road maintenance associated with project implementation would also benefit recreational activities. Impacts would be adverse in the short term, beneficial in the long term, and range from negligible to minor in magnitude at the local levels.

4.11 SOCIOECONOMICS

Direct and Indirect Effects from Alternative One – No Action

There would be short-term adverse and minor effects on the local economy under the No Action Alterative. Under the No Action Alternative, no service contracts would be granted, no jobs or raw materials would be generated, and no supplies would be purchased for the purpose of project implementation.

The local economy may also be affected as big game hunting opportunities in the project area are reduced under the No Action Alternative as habitat quality deteriorates. This effect could be considered long-term, minor, and adverse within Baker County.

Direct and Indirect Effects from Both Action Alternatives

Based upon expert analysis and previous experience, under the Proposed Action, it is estimated that 14-15 seasonal forestry or prescribed fire jobs would be created in the Malheur-Baker county area over a period of ten years. Revenue received by the agency for forest products or vegetation removed from the project area would reduce the cost of project implementation to the government and taxpayers.

The Proposed Action would utilize service contracts to prepare juniper woodlands for broadcast burning and perform small amounts of juniper cutting. The purchase of supplies and equipment necessary for implementation of the Proposed Action from community merchants would constitute an additional positive economic effect. Improving the quality of big game hunting in Baker County would have a long-term, minor, beneficial effect the local recreation and tourism industry.

4.12 CLIMATE CHANGE

Direct and Indirect Effects from Alternative One – No Action

Forest vegetation would continue to grow and sequester carbon, but would be more susceptible to forest insect/disease and severe wildfire outbreaks. The level of greenhouse gas emissions would depend on the severity, intensity and extent of the outbreak.

Live tree mortality rates from wildfire are typically greater than from prescribed fire resulting in fewer trees remaining to sequester carbon (Wiedinmyer, 2010) and there is evidence that not treating fuels increases the fuel availability.

In the event of a severe wildfire, the mortality of living trees and the amount of forest biomass consumed would be increased compared to a prescribed fire. The impacts resulting from a wildfire would be comparable to that of the Proposed Action Alternative in comparison to the total global CO^2 emissions. Except that the forest products (lumber and bio-fuel) would not be placed in long term storage. This would cause the breakdown and release of CO^2 back into the atmosphere at an accelerated rate compared to the action alternatives.

Overall, the direct and indirect effects of the No Action Alternative on greenhouse gas emissions are anticipated to be negligible.

Under the No Action Alternative, there would be no increase in emissions or changes to carbon sequestration. The forested areas would be more likely to experience a large-scale, stand-replacement wildfire that could indirectly result in elevated emissions and a long-term loss of carbon sequestration.

Direct and Indirect Effects from Both Action Alternatives

Fossil fuel combustion is a source of greenhouse gas emissions that can contribute to climate change. Emission sources for fuels reduction and ecological restoration activities would include heavy equipment, mobilization of equipment, and transportation of personnel and supplies. Emissions from these activities are expected to occur for approximately one month per year for up to 10 years. During each month of project activity, up to 10 vehicles a day would make round trips between Vale, Oregon and the Mormon Basin / Pedro Mountain project area, consuming approximately 2000 gallons of fuel each active month. These activities would release an estimated 178 metric ton of CO^2 equivalent to the atmosphere over the ten year period and incrementally contribute to global climate change. Estimates from fire effects models (FOFEM, FARSITE) suggest that prescribed burning over the ten year implementation period would generate 287,000 metric tons of CO^2 equivalent over the ten year period. To put these emissions in context, this total amount of emissions for a ten year period represents .04% of the total emissions that could be anticipated for the state of Oregon (66 million metric tons equivalent annually) during a ten year period. The total emissions from the project over ten years would represent approximately .005% of the total CO^2 emissions for the United States (5.5 billion metric tons CO^2 equivalent annually) which would be minor in magnitude in the short and long term.

The effects of the Proposed Action on overall carbon sequestration within the project area are likewise infinitesimal. In the forested environments within the project area, fuels reduction and restoration treatments would increase carbon sequestration and reduce CO^2 emissions over time. Models that include wildland fire have shown that fire prone forests dominated by large fire-resistant trees maximize carbon storage while minimizing carbon release during wildfires (Hurteau and North, 2008). Rangeland carbon sequestration would be reduced under both action alternatives with the removal of western juniper from the communities, although this loss would be at least partially off-set by increased grass and forb biomass on site over time.

The trend of global climatic warming with increasing atmospheric CO^2 levels would also effect the vegetation and other natural resources within the Mormon Basin / Pedro Mountain project area, although it is not possible to predict site specific changes. If it is assumed that wildfire intensity and frequency increase in the vicinity of the project area as the regional climate becomes hotter and dryer, both action alternatives would serve to make forested stands in the project area more resistant to undesirable fire effects associated with stand replacement wildfire. A warmer, carbon rich atmosphere could also result in increased threats to ecosystems from insects, disease, and invasive species.

5 CUMULATIVE EFFECTS

Cumulative effects are the aggregate of incremental changes in resource condition that result from the present, past, and reasonably foreseeable actions. In order for project effects to be considered cumulative, they must overlap in time and space with the effects of previous or foreseeable project effects. The cumulative effects analysis area was determined by delineating along watershed boundaries.

The 338,428 acre Mormon Basin / Pedro Mountain cumulative effects analysis area is composed of the Willow Creek, Burnt River, and Clarks Creek-Burnt River watersheds (referred to as 5th level Hydrologic Unit Codes [HUC]). This analysis area will be used to quantify effects on water quality, vegetation, and fuels that could be cumulative with other project or wildfire effects. The Mormon Basin / Pedro Mountain project area is situated in the upper elevations of the analysis area, and the headwaters of each watershed are within the project area boundaries. Within the cumulative effects analysis area, there are 220,927 acres in private ownership, 103,680 acres administered by the BLM, 13,208 acres are administered by the US Forest Service, and approximately 613 acres are managed by the state or other federal agency.

A vicinity map that displays the area of analysis for cumulative effects is included in Figure 1.1. A listing or inventory of past, present, and reasonably foreseeable activities is also identified in Appendix A. These activities were considered by each interdisciplinary team specialist for potential cumulative effects.

Both action alternatives include project design elements developed to avoid damage of Special Status Species habitat, retain big game cover, avoid cultural resources, and reduce conflict with recreational uses. Project design elements would reduce effects related to loss of soil productivity and sedimentation of water sources to levels that are immeasurable at a watershed scale. Effects of smoke on air quality would be short-lived and would not have the potential to combine with the effects of other burning projects. Therefore, the cumulative potential of these effects is not analyzed further in this document.

5.1 WATER QUALITY/WETLANDS RIPARIAN

Previous actions, present actions, and reasonably foreseeable actions – There would be no cumulative effects under the No Action Alternative because there would be no implementation of silvicultural treatments.

Present, proposed, and future management activities in these subwatersheds that could potentially add to cumulative effects from implementation of this project are mining, past timber harvest, and domestic grazing on public and private land.

Past and present placer mining impacts are visible in the riparian areas in the Mormon Basin streams and along Clarks Creek on both private and on BLM lands. Future placer mining is expected on BLM lands in Mormon Basin over the next 12 years and covers approximately 150 acres as well as in the Clarks Creek area, which covers approximately 40-60 acres. These mining plans of operations allow mining to occur in no more than 5 acre sections which would be reclaimed before moving on to the next section within the claim. Placer and hard rock mining continues on private land in the project area, also. Historic placer mining has left excessive sediment throughout the riparian areas in the Mormon Basin and Clarks Creek areas. Riparian vegetation remains scant and dominated by colonizers in these areas. Historic hard rock mining in the Sunday Hill area has been reclaimed, but has not had enough time to support vegetation cover adequate to intercept precipitation, promote infiltration, and percolation. This area remains susceptible to erosion and has a potential to deliver excess sediment to streams in the area. The Mormon Basin Fuels project would implement activities on a small portion of this area and, consequently, contribute negligible and non-measurable impacts on the upland hydrology, stream water quality, and riparian condition.

As described in the Forest and Forest Health effects analysis, past timber harvest activity occurred on approximately 600 acres of BLM and private land between 1950 and 1988. The existing roads from these past activities would be used for access in this project. The historic skid trails have revegetated, by and large. Due to the small scale of this project (based on treatment unit size and distribution), project implementation would not add to cumulative effects on water resources within the analysis area.

Historic livestock grazing on allotments that encompass the project area have left select streams in the SF Dixie, NF Dixie, Deer Creek areas vulnerable to unraveling during future high flow events. These stream systems are showing favorable responses to changes in the current grazing management. Implementation of this project would not add to cumulative effects in the analysis area.

5.2 NON-FOREST VEGETATION

Previous actions, present actions, and reasonably foreseeable actions – There are 296,584 acres of non-forested vegetation (sagebrush steppe or agricultural) within the cumulative effects analysis area. More than 93,830 acres of the non-forest vegetation type within the analysis area is administered by the BLM. Just over 143,290 acres of the sagebrush steppe in the cumulative effects is classified as a mountain big sagebrush (+12" precipitation zone) dominant plant community and approximately 149,333 acres is estimated to be dominated by a Wyoming sagebrush (less than 12" precipitation zone) plant community.

Previous juniper control efforts such as the Shirttail Creek Prescribed Burn Project (EA-025-99-50) and the Segundo Springs Prescribed Burn Project (EA-025-2000-04) have acted together to incrementally reduce the influence of western juniper on approximately 10,500 acres of BLM administered sagebrush steppe within the analysis area. It is estimated that about 10%, or 20,000 acres, of the privately owned sagebrush steppe in the analysis area has also been treated to reduce the influence of western juniper within the last 20 years. Wildfires have also reduced the influence of western juniper expansion on sagebrush steppe in the analysis area. Since 1980, 187 wildland fires have burned within the sagebrush dominated plant communities in the analysis area, and it is assumed that these incidents have reduced the effects of western juniper encroachment on rangelands. Approximately 41,000 acres of sagebrush steppe communities in the analysis have been affected by wildland fire since 1980. In sum, about 71,000 acres (24%) of sagebrush steppe plant communities in the analysis area have had the influence of western juniper reduced through the effects of intentional juniper control projects or through the effects of wildfire.

With implementation of an action alternative, approximately 10,000 acres of shrub steppe plant communities within the analysis area will be treated to reduce western juniper encroachment. Combined with the 71,000 previously affected acres, this represents approximately 81,000 acres or 27% of acres classified as mountain big sagebrush (+12" precipitation zone) or Wyoming sagebrush within the cumulative effects analysis area.

It is anticipated that efforts to reduce the effects of western juniper encroachment on western sage-grouse habitat on private and BLM lands in northern Malheur County will accelerate within the next 10 years. It is estimated that within this timeframe, approximately 25% of the 121,140 acres (30,000 acres) of non-forested vegetation within the cumulative effects area that is also within Malheur County would be treated to reduce juniper encroachment. This would represent about 110,000 acres within the cumulative effects analysis area or about 38% of the non-forested vegetation within the cumulative effects area. This estimate is based upon conversations with the Oregon Watershed Enhancement Board (OWEB), private landowners in northern Malheur County, and Oregon Department of Fish and Wildlife (ODFW) officials.

Roughly 400 acres of sagebrush steppe communities would be treated with a broadcast herbicide application under the Proposed Action and the treatment would be focused in low elevation warm – dry plant communities. This action could be considered cumulative with previous activities within the cumulative effects analysis area that have reduced the presence of annual grasses such as the seeding of perennial grass species for emergency fire stabilization projects or as seedings installed as rangeland improvements. There are approximately 4202 acres of perennial grass seedings that have been planted between 1961 and 2005 within the cumulative effects area. These seedings account for roughly 1.5% of the sagebrush ecological communities in the cumulative effects area. If 2500 acres of warm-dry sagebrush communities are treated with a pre-emergent herbicide for annual grass control then this effect would be cumulative with those previous seedings and reduce the dominance of annual grass on 6702 total acres. This represents 2.3% of the non-forested vegetation acreage in the cumulative effects analysis area. No broadcast herbicide treatment would be applied under the Low Impact Alternative.

5.3 FOREST AND WOODLAND VEGETATION

Previous actions, present actions, and reasonably foreseeable actions – There are 34,678 total acres of warm-dry (mixed conifer) and hot-dry (ponderosa pine) forest within the cumulative effects analysis area. More than 26,000 acres (about 75%) of the total forested acreage in the cumulative effects area can be described as a warm-dry mixed conifer plant association. This type of forest exists on lands managed by the Forest Service, the BLM, or held in private ownership within the cumulative effects analysis area. Roughly 8200 acres (about 25%) of the forest within the cumulative effects can be classified as hot-dry forest type that is dominated by ponderosa pine. This forest type occurs in the lower to middle elevations of the cumulative effects area on privately owned and BLM managed lands.

It is estimated that just over 7000 acres (38%) of the warm-dry forest type within the cumulative effects area has been mechanically treated to attain objectives similar to those described in the Mormon Basin – Pedro Mountain Proposed Action. Nearly all of those treatments occurred on land administered by the US Forest Service in the Sundry-Rooster Rock Fuels Project. The current warm-dry forest treatment proposal would treat approximately 3,000 acres with a combination of non-commercial thinning, overstory removal, and various types of prescribed fire fuels reduction treatments. The effects of these activities would combine with the effects of previous treatments to reduce the threat of stand-replacement wildfire on just over 10,000 acres (38%) within the cumulative effects analysis area. Reasonably foreseeable future actions on BLM administered lands in the northwestern watershed of the cumulative effects area would result in an additional 3000 acres of warm-dry forest fuels reduction treatments. In total, the previously completed treatments, reasonably foreseeable treatments, and treatments under the current Proposed Action, would combine to reduce the likelihood of undesirable fire effects on approximately 13,000 acres (50%) of the warm-dry forest type in the cumulative effects area.

An estimated 1500 acres (19%) of the hot-dry forest type within the cumulative effects area has been mechanically treated to attain objectives similar to those described in the Mormon Basin – Pedro Mountain Proposed Action. Those treatments have occurred on privately owned forestland over the past 10 years. The current hot-dry forest treatment proposal would treat approximately 2000 acres with a combination of non-commercial thinning, limited overstory removals, and various types of prescribed fire fuels reduction treatments. The effects of these activities would combine with the effects of previous treatments to reduce the threat of stand-replacement wildfire on just over 3500 acres (43%) within the cumulative effects analysis area. There are no reasonably foreseeable future treatments of the hot-dry forest type known to be planned in the cumulative effects analysis area at this time.

6 LIST OF PREPARERS

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Appendix A: Mormon Basin / Pedro Mountain Fuels Management Project Monitoring Plan

1. Introduction

This monitoring plan describes the activities that the Baker Field Office staff and Vale District Fire personnel will perform to ensure that prescribed burning and mechanized vegetation treatments conform to project design criteria and meet objectives established in Chapter II of EA OR-06-025-056. The plan guides implementation and effectiveness monitoring through the year 2020 for all burning and mechanical vegetation treatments described in the EA. Implementation monitoring assesses whether a project is implemented as designed while effectiveness monitoring is employed to address questions about the accomplishment of the specific treatment objectives and the long-term effectiveness of project design elements. This monitoring plan satisfies the monitoring needs described in the Baker Resource Management Plan and Final Environmental Impact Statement, as well as the prescribed fire monitoring requirement described in the Interagency Standards for Fire and Fire Aviation Operations 2003 (USDI – USDA).

This plan is not a decision document. If monitoring should determine that treatments outside the scope of the Proposed Action are necessary, then a separate site-specific environmental analysis and decision document may need to be prepared.

2. Coordination

Since many different resources will be monitored, respective managers and specialists will be involved with various aspects of the monitoring program. Scheduled monitoring visits and data collection will be dependent on treatment objectives, timing of implementation activities, and the responses of specific resources to fire and fire surrogates. For this reason, close and frequent coordination between resource specialists, implementation specialists, and management is essential.

3. Roles and Responsibilities

The following is a list of key personnel, and their responsibilities, involved in coordinating and implementing the Mormon Basin / Pedro Mountain Monitoring Program.

Baker Field Office Manager

1) Updates the District Fuels Planner and/or Interdisciplinary Team of any significant issues raised by publics or stakeholders pertinent to monitoring program.

Deputy Fire Staff

1) Serves as a liaison between the Burns BLM line officers, State Office and research personnel, and all other agency personnel.

District Fuels Planner

1) Tracks and manages budget for monitoring activities on an annual basis.
2) Works with specialists to develop data collection protocols.
3) Ensures that information is forwarded to appropriate line officers, resource specialists, research personnel, and personnel from other agencies.
4) Works with Interdisciplinary Team (resource specialists).
5) Works with burn supervisors.
6) Works within Fire/Fuels and District organizations to secure critical personnel and resources for monitoring program.

Resource Advisors (Archaeologist, Botanist, Fire Ecologist, Wildlife Biologist, Noxious Weeds, Livestock Grazing, Aquatics, Forestry)

1) Conducts resource-specific implementation and effectiveness monitoring.
2) Maintains monitoring documentation and forwards documentation to the District Fuels Planner if necessary.

Project Prescribed Burn Supervisor

1) Conducts all implementation monitoring associated with prescribed burning that is not conducted by an onsite resource advisor.
2) Ensures monitoring is documented and forwards results to the District Fuels Planner if necessary.

Juniper Pretreatment Contracting Officer's Representative (COR)

1) Conducts all implementation monitoring associated with mechanical juniper pretreatments that are not conducted by an onsite resource advisor.
2) Ensures monitoring is documented and forwards results to the District Fuels Planner if necessary.

Mechanical Treatment COR/Timber Sale Administrator

1) Conducts all implementation monitoring associated with mechanical treatments (pine thinning, juniper cutting) that is not conducted by an onsite resource advisor.
2) Ensures monitoring is documented and forwards results to the District Fuels Planner if necessary.

Allotment Administrator (Range)

1) Conducts implementation monitoring to ensure that the desired post-fire understory vegetation response is achieved.
2) Maintains monitoring documentation and forwards documentation to the District Fuels Planner if necessary.
3) Coordinates and communicates with allotment permittees and adjacent landowners when necessary.
4) Ensures that pastures are rested for appropriate periods following prescribed fire treatments and that alternative forage is secured.
5) Works with burn supervisors and Juniper Pretreatment Project Inspector while planning juniper cut pretreatments, burn plan development, and prescribed fire implementation.

3. Results and Documentation

Monitoring results will be utilized to: 1) document fire and silvicultural thinning effects; 2) evaluate the success or failure of treatments and project design elements; and 3) assess the potential for future treatments and project design elements. Monitoring results and documentation will be maintained by individual resource specialists in paper files, electronic databases, and possibly in a Geographic Information System. Results may also be kept in a prescribed fire project file or tracked with the FIREMON Fire Effects Monitoring and Inventory Protocol Database and Analysis Tools by the District Fuels Planner.

Table 1. Mormon Basin/Pedro Mountain Monitoring Program

Element	Implementation or Effectiveness Monitoring	Objective	Methods	Responsibility	Timing
Cultural Resources	Effectiveness	Evaluate the effectiveness of project design elements at protecting cultural resources.	Conduct monitoring visits at a sample of cultural resources (No more than 10% of total sites in project area) and compare post-burn conditions to conditions described in cultural resource databases. Possibly conduct pre-burn vs. post-burn artifact analyses.	Archaeologist	Within 1-year of treatment, with visits every 3 years if necessary

Element	Implementation or Effectiveness Monitoring	Objective	Methods	Responsibility	Timing
Rangeland	Implementation	Ensure that pastures are rested for two growing seasons following prescribed burn.	Coordination and communication with allotment permittees.	Allotment Administrator	After implementation of prescribed fire
Fuels Management	Effectiveness	Determine if fuels in treatment units are reduced sufficiently to meet treatment objective	Visually estimated burned areas, delineation with GPS.	District Fuels Planner	After implementation
Fuels Management	Implementation	Determine if weather conditions and prescribed fire parameters are within the range of variability.	Will monitor any site or time specific weather and fire criteria as identified in the project burn plan.	Rx Burn Supervisor	During Implementation
Smoke Plume (Air Quality)	Effectiveness	Determine trajectory and vertical dispersion of smoke plumes.	-Visual observation of smoke plume from ground level. -Assessment of wind speed and direction on day of implementation	Rx Burn Supervisor	During and immediately after implementation
Hazardous Materials	Effectiveness	Ensure that all fuel spills are contained without harm to personnel or the environment.	Immediately control and/or clean spill through use of hazmat spill kit. Report large spill (> 42 gallons) to hazmat coordinator.	Rx Burn Supervisor Mechanical Treatment COR	During implementation

Element	Implementation or Effectiveness Monitoring	Objective	Methods	Responsibility	Timing
Wildlife Biology – Big Game Cover	Implementation	Determine if adequate big game cover remains in treatment units after implementation	Visual estimate.	Wildlife Biologist	During and immediately after implementation
Wildlife Biology – Avian	Implementation	Determine if sufficient snags and large downed wood (LWD) remain in treatment units after implementation.	Count LWD and snags per acre in treatment units.	Wildlife Biologist	During and immediately after implementation
Wildlife Biology – SSS	Implementation	- Ensure that structures or areas with SSS habitat value are protected in treatment units. - Ensure that juniper is treated in 2-mile buffer around identified sage-grouse leks.	Monitor activities such as line construction, prescribed fire ignition, and mop-up with visual observation, photography, and written description.	Wildlife Biologist	During and after implementation

Element	Implementation or Effectiveness Monitoring	Objective	Methods	Responsibility	Timing
Fisheries Biology – SSS	Implementation	-Ensure that activities along Creek are limited to pre-commercial thinning, jackpot burning, and pile burning. -Ensure piles are constructed at least 50 feet from Creek flood plain.	Monitor Silvicultural Thinning Treatment within the Bluebucket Treatment Area.	Aquatics Specialist Mechanical Treatment COR	During and after implementation
Fisheries Biology – SSS	Effectiveness	Ensure that large downed wood in riparian areas is maintained. Cut conifers in stream channel for downed wood recruitment if necessary.	Monitor activities prescribed fire ignition visual observation, photography, and written description.	Aquatics Specialist	During and after implementation
Aquatics	Effectiveness	Evaluate riparian response to thinning and/or burning.	Conduct greenline monitoring.	Aquatics Specialist	One year prior to treatment to gather baseline data and at 2, 5, and 8 years following treatment.
Non-Forest Vegetation – Juniper Mortality	Effectiveness	Determine if juniper mortality in treatment units meets 70% objective.	Visual estimate	Rx Burn Supervisor	During implementation and immediately after

Element	Implementation or Effectiveness Monitoring	Objective	Methods	Responsibility	Timing
Non-Forest Vegetation – Mountain Big Sagebrush Restoration Treatment	Effectiveness	Determine if broadcast burn targets of 40-60% in early-intermediate juniper woodlands and 90-100% in late transitional woodlands is attained.	Visual estimate, possibly using GPS delineation or aerial observation.	Resource Advisor	During or immediately after implementation
Vegetation – Low Sagebrush Enhancement Treatment	Effectiveness	Determine if acreage treatment target of 60-80% in low sagebrush/bunchgrass plant communities is attained.	Visual estimate, possibly using GPS delineation or aerial observation.	Resource Advisor	During or immediately after implementation
Vegetation – Wyoming Sagebrush Juniper Encroachment Treatment	Effectiveness	Determine if acreage treatment target of 90-100% Wyoming/bunchgrass plant communities is attained.	Visual estimate, possibly using GPS delineation or aerial observation.	Resource Advisor	During or immediately after implementation
Vegetation – Mahogany / bitterbrush and deciduous stands	Effectiveness	Determine if juniper mortality in bitterbrush, mahogany, and deciduous stands meets objectives.	Monitor during implementation possibly using photography or written description.	Rx Burn Supervisor Mechanical Treatment COR Aquatics Specialist	During or immediately after implementation

Element	Implementation or Effectiveness Monitoring	Objective	Methods	Responsibility	Timing
Vegetation – Post-fire understory response	Implementation	Ensure that adequate understory seed source is available in prescribed fire treatment units.	Visual estimates, belt transects.	Allotment Administrator	Prior to implementation and/or immediately afterward
Vegetation – Bitterbrush Resprout	Effectiveness	Determine resprout success of burned bitterbrush shrubs.	Belt transects.	Wildlife Biologist	Preburn, 1-year following treatment, and at 3-year intervals for 12 years
Forestry	Effectiveness	Determine if canopy closure and canopy base height objectives are attained following mechanical treatment.	Develop tree marking guidelines and monitor unit layout and marking.	Forestry Specialist	During implementation
Roads	Implementation	Ensure roads used during project implementation are returned to a state that is similar to prior condition.	Visual estimates.	Rx Burn Supervisor Mechanical Treatment COR	After implementation

Appendix B: Proposed Action Activity Descriptions

Activities are specific actions that would be taken to attain the objectives set forth in the four treatments. Activities, that would include various forms of prescribed fire, mechanized thinning or cutting and an application of a pre-emergent herbicide, are described below.

PRESCRIBED BURNING

Prescribed burning would be used to varying degrees in all five of the fuels management treatments. These treatments would include activities such as broadcast burning, jackpot burning, underburning, and/or piling and burning.

Burning prescriptions would vary depending on specific management objectives and would only allow fire behavior adequate to reduce the stocking of fully and partially developed juniper woodlands on rangelands, or reduce natural and activity generated fuels in pine dominated forests and woodlands. Pile burning would be a primary activity used in both silvicultural thinning treatments and it would also be primary activity utilized in mountain big sagebrush – bunchgrass ecological sites in the project area. Jackpot burning would most often be applied in areas that support low elevation sagebrush communities (Wyoming or basin big sagebrush), or were identified for treatment under the Mountain Shrub Maintenance/Riparian Hardwood Enhancement portions of the project to limit the size of burned patches and/or preserve existing plants. Broadcast burning would be limited to a primary form of treatment used in the mountain big sagebrush – bunchgrass dominated ecological sites and it may be utilized on a limited basis within upland groves of quaking aspen. Underburning would only be applied in pine dominant or mixed conifer forest.

Although the target treatment areas consist of the sections of the South Bridgeport, Devils Canyon, Towne Gulch, Log Creek, Pedro Mountain, Dixie Creek, Mormon Basin, Bowman Flat, and Pine Creek grazing allotments that form the Mormon Basin / Pedro Mountain planning area (See Figure 1.1), there are areas adjacent to project area boundaries where burning is allowable without declaration of a wildfire. In the event that fire spread beyond a targeted area (See Figures 2.1 and 2.2), the burn boss and resource advisors on site would determine if suppression actions are warranted.

Tools such as drip torches, fusees, aerial ignition, and other firing devices are typically used to ignite prescribed burns. Roads, natural barriers, and mechanically constructed fireline (less than three miles) would be utilized as fire breaks at the boundaries of burning units. Two track four wheel drive roads that are positioned along burn unit boundaries may be bladed to improve their ability to function as a control line. Broadcast burning operations would be monitored to ensure that project design elements are properly observed and objectives are achieved. Once treatment objectives are attained within targeted vegetation communities, no remaining acres within that community type would be treated within the burn units. All burn plans would include an escaped fire suppression plan and a smoke management plan. Use of petroleum products during ignition would be monitored to ensure that any spill was immediately contained and neutralized.

PILE BURNING

Mechanical piling and/or hand piling would be used to reduce fuel loading and continuity primarily in areas where conifers have been cut manually. Machine piles are usually 8 to 12 feet tall by 16 to 22 feet wide and would be constructed of previously cut pine and/or juniper by grapple-equipped excavators or dozers. Hand piles are usually constructed of bucked up slash on ground where machine piles cannot be constructed due to excessive slope or other resource reasons. Hand piles are generally three to five feet tall by three to five feet wide. All piles would be burned within two years of construction when conditions allow. These conditions are based on fuel moisture content, minimizing the probability of spread, atmospheric conditions, and the growing season of surrounding vegetation. This usually occurs September to January. Burning hand piles and machine piles would be an activity that would occur in the seven forest thinning units under the two silvicultural thinning treatments included in the Proposed Action. It would also be utilized under the Mountain Big Sagebrush / Bunchgrass restoration treatment to reduce the influence of conifer encroachment on the ecological community while maintaining shrub cover. Pile burning would be an activity that occurs on approximately 4500 – 7500 acres within the project area.

UNDERBURNING

Underburning is the application of low intensity prescribed fire to surface fuels beneath a forested canopy. Burning is prescribed to reduce stocking density of small diameter (less than 8" in diameter) conifer trees and to reduce ground fuels (litter, twigs, branches <3"). Underburning would be applied primarily in the treatment units subsequent to the completion of silvicultural thinning. It may be utilized occasionally in pine dominated woodlands located in the north-central portion of the project area.

Example of low intensity forest underburn.

The majority of the underburning would occur during the spring or as conditions allow. These conditions are based on fuel moisture content, minimizing the probability of spread, atmospheric conditions, and the growing season of surrounding vegetation to maintain a low intensity burn. Pre-treatment of the burning areas in the fall could be necessary to reduce the risk of escapement during spring burning. The pre-treatment would include activities such as establishing blacklines or constructing handline around the perimeter of leave islands or adjacent to burn unit boundaries. Underburning would be implemented as a primary activity under both silvicultural thinning treatments described in the Proposed Action. It would be utilized in the seven silvicultural treatment areas and on a total of approximately 4500 acres of mixed conifer forest or woodland in the project area.

JACKPOT BURNING

Results of an early season jackpot burn.

Jackpot burning is the application of prescribed fire to concentrations of fuels. It is typically applied during the time of year when the probability of fire spread is very low. Jackpot burning would be implemented in the late fall, winter, or spring seasons when soil and live fuel moistures are elevated and existing shrubs are more likely be maintained. Jackpot burning is the method used in units where residual activity created fuel loads is discontinuous. Jackpot burning may also be applied in areas where natural fuel concentrations exist in isolated areas.

Jackpot burning would be the principal activity employed under the Wyoming Sagebrush / Bunchgrass Restoration treatment to address western juniper encroachment in the plant community while limiting fire related soil disturbances. It would also be used under the Mountain Shrub / Riparian Hardwood Enhancement treatment to maintain stands of mountain mahogany, quaking aspen, willow, and cottonwood. Jackpot burning would be utilized on approximately 3000 – 4000 acres within the project area.

BROADCAST BURNING

Broadcast burning is the controlled application of fire to wildland fuels within a predetermined large area during specific environmental conditions in order to attain resource management or fuels reduction objectives. Broadcast burning would only be applied to partially cut phase II+ stands of western juniper under the Proposed Action (See Figure 2.6).

Portions of shrubland or riparian communities that are in the middle juniper woodland transitional stages would be mechanically pre-treated in order to generate heat sufficient to kill mature trees. Individual trees would be periodically felled against standing trees and allowed to cure in order to create a ladder that allows ground fire to move into the canopies of standing uncut trees. Sites that do not support the large trees typical of communities in the latter stages of juniper woodland development would not require any form of mechanical treatment prior to the application of prescribed fire. Other pre-treatment activities that may occur within or near broadcast burn units include wetlining, blacklining, and handline construction around leave interior leave islands and fire-sensitive assets such as range improvements or cultural resources. Holding operations near property boundaries may be accomplished with pre-treatment using small amounts of jackpot burning, juniper cutting, and/or piling and burning. Broadcast burns are generally implemented in the fall (September, October) to moderate undesirable fire behavior.

The scheduling of the burning during the ten year implementation period is dependent upon weather, fuel conditions, project funding, and arrangements with the grazing permittees. Broadcast burning operations require one growing season of grazing rest prior to treatment and two growing seasons of rest following treatment. These factors, especially weather, make it difficult to accurately project the number of acres of burned in a given year.

MECHANICAL THINNING AND CUTTING

Variable density thinning would be the primary activity applied under the silvicultural thinning treatments in the Proposed Action. Variable density thinning involves a combination of commercial and non-commercial thinning techniques that results in retention of trees grouped in small dispersed patches with ladder fuels and crown fuels that are substantially reduced. Varied tree spacing, as opposed to even spacing is desirable. Tree clumping for stand diversity will be left as well as creating small openings to create a “gappy” appearance.

NON-COMMERCIAL THINNING

Non-commercial thinning involves manually cutting non-merchantable trees (< 9” diameter) to reduce fuel laddering and/or help achieve specific resource objectives. Non-commercial thinning would be accomplished with chainsaws or hand tools. The activity fuels generated by this activity would be piled or possibly burned as jackpots. Most slash generated between December 1 and July 1 would be removed from treatment units to guard against tree mortality from *Ips* bark beetle attacks (See Section 2.5, Project Design Elements). In aspen stands up to 1/3 of older, dying aspen maybe cut and left on site to rejuvenate sprouting.

COMMERCIAL THINNING

Commercial thinning removes merchantable (> 9” diameter) trees to reduce the fuels in a forested canopy that allow for the development of high intensity crown fires. It also improves the health and growth rate of trees remaining in a stand following treatment by removing stressed/diseased trees and reducing competition stress of remaining trees.

Commercial harvest activities conducted on slopes of less than 35% would be performed using ground-based equipment such as a mechanical harvesters, tractors, and rubber-tired skidders. Harvest activities occurring on terrain with slopes exceeding 35% would be conducted with a skyline logging system or by helicopter. Slash generated by the commercial harvest would be removed to a landing for disposal by burning or for biomass utilization if economically feasible. Otherwise, activity fuels generated by commercial harvest would be piled within treatments units for burning. Commercial thinning within the project area would be conducted under timber sales or possibly under stewardship contracts.

CONIFER CUTTING – FALL AND LEAVE OR LOP AND SCATTER (NO BURNING)

In some situations, conifers (most likely juniper, pine, or fir trees) would be felled, lopped, and scattered under the action alternatives. There would be no follow-up burning when this treatment is applied. A conifer cutting only treatment may be applied in Wyoming sagebrush and low/stiff sagebrush communities that are in early stages (Phase I) of transition to juniper woodland or as a strategy to reduce juniper encroachment within stands of mountain mahogany or bitterbrush while maintaining existing shrubs. It may also be applied to reduce the density of pine woodlands. This treatment would only be applied where risks associated with hazardous fuels are considered to be low.

Appendix C: Riparian and Fisheries Design Features

Riparian Management Areas (RMAs)
RMAs are portions of watersheds where riparian-dependent resources receive primary management emphasis. RMAs are not intended to be treated as 'no management' zones, since treatments may be essential to achieving or maintaining desired riparian and aquatic conditions. RMAs include riparian corridors, wetlands, intermittent, perennial, and headwater streams, and other areas where "proper" ecological function is crucial for maintaining water, sediment, woody debris, and nutrient delivery to the system, so that they function within the natural range of variability.

RMA width is a function of site condition and is based on potential to affect aquatic and riparian function and value. This strategy allows for adjustment of RMA widths to reflect site-specific conditions while also recognizing watershed-wide riparian conditions and trends. The widths of RMAs shall be adequate to protect the stream from non-channelized sediment inputs and sufficient in size to deliver organic matter and woody debris, as well as to provide stream shade and bank stability. RMA dimensions may be modified or adjusted via watershed analysis, or where stream reach data and/or site-specific analysis supports a modification to default RMA dimensions, including during project-level planning.

With the exception of units where RMA dimensions have been modified as a result of site-specific analysis or the presence of roads, the following default RMA dimensions would be implemented on all units within the Project Area within the following four categories of stream or water body:

Category 1: Fish-bearing streams
Category 1: RMAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or the extent of the Rosgen flood-prone area width (Rosgen, 1996), or to the outer edges of riparian vegetation, or to the extent of unstable source areas, or 300 feet slope distance on both sides of the stream channel, whichever is greatest.

Category 2: Perennial non-fish bearing streams
Category 2: RMAs consist of the stream and the area on either side of the stream extending from the edges of the active stream channel to the top of the inner gorge, or the extent of the Rosgen flood-prone area width (Rosgen, 1996), or to the outer edges of riparian vegetation, or to the extent of unstable source areas, or 150 feet slope distance on both sides of the stream channel, whichever is greatest.

Category 3: Ponds, lakes, reservoirs, and wetlands greater than one acre
Category 3: RMAs consist of the body of water or wetland and the area to the outer edges of riparian vegetation, or to the extent of the seasonally saturated soil, or 150 feet slope distance from the edge of the maximum pool elevation of constructed ponds and reservoirs, or from the edge of the wetland, pond, or lake, whichever is greatest.

Category 4: Intermittent or seasonally flowing streams and wetlands less than one acre, and unstable areas (i.e., landslides and landslide-prone areas).
Category 4: RMAs consist of the intermittent or seasonally flowing stream channel or wetland to the extent of unstable source areas, or to the outer edges of riparian vegetation, or 50 feet slope distance on both sides of the stream channel or from the edge of the wetland, pond, or lake, whichever is greatest.

Appendix D: Glossary of Terms

Amsl: Above mean sea level

Basal area: The area of a given section of land that is occupied by the cross-section of tree trunks and stems at their base.

Biomass utilization: The harvest, sale, offer, trade, or utilization of woody biomass to produce bioenergy and the full range of biobased products including lumber, composites, paper and pulp, furniture, housing components, round wood, ethanol and other liquids, chemicals, and energy feedstocks (historically non utilized or underutilized material).

Blackline: Preburning of fuels adjacent to a control line before igniting a prescribed burn. Blacklining is usually done in heavy fuels adjacent to a control line during periods of low fire danger to reduce heat on holding crews and lessen chances for spotting across control line.

Burning prescription: A plan specifying management objectives to be obtained, and air temperature, humidity, season, wind direction and speed, fuel and soil moisture conditions under which a fire will be started or allowed to burn.

Class II Cultural Resource Inventory: A sample based field survey designed to characterize the density, diversity, and distribution of cultural resource properties in an area of potential effect.

Dbh: Diameter at breast height

Prescription: A plan specifying management objectives to be obtained, and air temperature, humidity, season, wind direction and speed, fuel and soil moisture conditions under which a fire will be started or allowed to burn.

Road Decommissioning: Closing the road entrance with a barricade, waterbarring and seeding the road surface, and allowing road segment to return to natural condition as vegetation grows.

Road Obliteration: Recontouring the road entrance to restrict vehicle access and decompacting and the entire length of the road to restore natural drainage patterns.

Skyline Logging System: Logging system where logs are transported on a suspended cable from where trees are felled to a central area. Logs are connected to cable by means of choker cables and carriages.

Thinning From Below: A silvicultural prescription that removes trees from suppressed, intermediate and some in co-dominant crown classes leaving larger dominant and co-dominant trees in the stand.

Unstable source areas: defined as those areas that provide source for in-channel structure, which includes channel components that provide roughness, sediment capture and release, and instream habitat. These components can vary by vegetation and stream type, stream size, and ecologic zone.

Wetline: A line of water, or water and chemical retardant, sprayed along the ground, which serves as a temporary control line from which to ignite or stop a low-intensity fire.